JAMES A. PETERS

HERPETOLOGICA

A JOURNAL DEVOTED TO THE STUDY OF
REPTILES AND AMPHIBIANS

CHAPMAN GRANT, 2970 Sixth Ave., San Diego 3, Calif. Pub.
WALTER L. NECKER, Ed. in absentia militari. $3.00 per vol.

Vol. 2 San Diego, California, April 20, 1945 Nos. 7-8

MEET DR. LAURENCE M. KLAUBER

Of him "'Who's Who in America" says among other things: "Electrical engineer; born in San Diego, Cal., Dec. 21, 1883; A. B. Stanford Univ., 1908; honorary LL. D. U. of Cal. 1941; Westinghouse Apprenticeship Course, 1910; with San Diego Gas & Electric Co., since 1911, now vice-president in charge of operations, vice-president and general manager since 1941; Curator of Reptiles, San Diego Zoological Society; Curator of Herpetology and Fellow, San Diego Society of Natural History; Fellow American Institute of Electrical Engineers; A. A. A. S.; American Geological Society; member: American Society of Civil Engineers, American Society Mechanical Engineers, American Chemical Society, Pacific Coast Electrical Association (Pres. 1923-1924), American Gas Association, Pacific Gas Association (Pres. 1927-1928), American Mathematical Society, Mathematical Association of America, Seismological Society of America, American Museum of Natural History, California Academy of Sciences, American Society of Ichthyologists and Herpetologists (Pres. 1938-1940), San Diego Zoological Society, American Ecological Society, West ern Society of Naturalists, American Statistical Association, Fine Arts Society of San Diego, Sigma Xi, Tau Beta Pi, Republican. Author of various publications on electrical distribution and reptiles."

His Doctor's Degree from the University of California states: "Native of this State and son of our friendy rival, Stanford University—scholar in the fields of engineering and natural history—inventor of ingenious electrical distribution apparatus-inspiring force in many a scientific organization—student of reptiles, skilled in the application of statistical methods—a business executive, who by sheer love of learning, has made a place for himself in the company of academic men."

Dr. Lawrence M. Klauber

HERPETOLOGICAL PAPERS OF LAURENCE M. KLAUBER FROM 1924 TO 1945

1. 1924. Notes on the Distribution of Snakes in San Diego County, California. Bull. Zool. Soc. San Diego, no. 1, pp. 1-23, figs. 1-5, map, tables 1-3.
2. 1924. **Tantilla eiseni** Reported from Lower California. Copeia, no. 131, p. 62.
3. 1926. Field Notes on **Xantusia henshawi**. Copeia, no. 152, pp. 115-117. (Translation by F. Molle in Blaet. Aquar. Terrar., jahrg 39, no. 11, pp. 216-218.)
4. 1926 The Snakes of San Diego County, California. Specimens Collected for the Zoological Society Jan. 1, 1923 to Dec. 31, 1925 (Table). Copeia, no. 155, p. 144.
5. 1927. Some Observations on the Rattlesnakes of the Extreme Southwest. Bull. Antivenin Inst. Amer., vol. 1, no. 1, pp. 7-21, figs. 1-9, map, tables 1-2.
6. 1927. Notes on the Salamanders of San Diego County, California. Bull. Zool. Soc. San Diego, no. 3. pp. 1-4, fig. 1.
7. 1928. The Collection of Rattlesnake Venom. Bull. Antivenin Inst. Amer., vol. 2, no. 1, pp. 11-18, figs. 1-9.
8. 1928. The **Trimorphodon** (Lyre Snake) of California, with Notes on the Species of the Adjacent Areas. Trans. San Diego Soc. Nat. Hist., vol. 5, no. 11, pp. 183-194, plates 22-23, map.
9. 1928. A List of the Amphibians and Reptiles of San Diego County, California. Bull. Zool. Soc. San Diego, no. 4. pp. 1-8.
10. 1929. Range Extentions in California. Copeia, no. 170, pp. 15-22.
11. 1930. New and Renamed Subspecies of **Crotalus confluentus** Say, with Remarks on Related Species. Trans. San Diego Soc. Nat. Hist. vol. 6, no. 3, pp. 95-144, plates 9-12, map.

12. 1930. A List of the Amphibians and Reptiles of San Diego County, California. Second Edition. Bull. Zool. Soc. San Diego, no. 5, pp. 1-8.

13. 1930. Differential Characteristics of Southwestern Rattlesnakes Allied to **Crotalus atrox.** Bull. Zool. Soc. San Diego, no. 6, pp. 1-72, plates 1-6, map, tables 1-12.

14. 1931. A New Subspecies of the California Boa, with Notes on the Genus **Lichanura.** Trans. San Diego Soc. Nat. Hist., vol. 6, no. 20, pp. 305-318, plate 21, map.

15. 1931. A Statistical Survey of the Snakes of the Southern Border of California. Bull. Zool. Soc. San Diego, no. 8, pp. 1-93, figs. 1-8, maps 1-3, tables 1-8.

16. 1931. **Crotalus tigris** and **Crotalus enyo,** Two Little known Rattlesnakes of the Southwest. Trans. San Diego Soc. Nat. Hist., vol. 6, no. 24, pp. 353-370, plate 23, map, table.

17. 1931. Notes on the Worm Snakes of the Southwest, with Descriptions of Two New Subspecies. Trans. San Diego Soc. Nat. Hist., vol. 6, no. 23, pp. 333-352, map.

18. 1931. A New Species of **Xantusia** from Arizona, with a Synopsis of the Genus. Trans. San Diego Soc. Nat. Hist., vol. 7, no. 1, pp. 1-16, plate 1, map.

19. 1931. An Addition to the Fauna of Lower California. Copeia, no. 3 of 1931, p. 141.

20. 1932. A Herpetological Review of the Hopi Snake Dance. Bull. Zool. Soc. San Diego, no. 9, pp. 1-93, plates 1-5.

21. 1932. Notes on the Silvery Footless Lizard, **Anniella pulchra.** Copeia, no. 1 of 1932, pp 4-6.

22. 1932. The Flat-tailed Horned Toad in Lower California. Copeia, no. 2 of 1932, p. 100.

23. 1932. A Coral King Snake of Peculiar Coloration. Yosemite Nature Notes, vol. 11, no. 9, p. 1.

24. 1932. Amphibians and Reptiles Observed Enroute to Hoover Dam. Copeia, no. 3 of 1932, pp. 118-128.

25. 1933. Notes on **Lichanura.** Copeia, no. 4 of 1933, p. 214.

26. 1934. An Addition to the Fauna of New Mexico and a Deletion. Copeia, no. 1 of 1934, p. 52.
27. 1934. Annotated List of the Amphibians and Reptiles of the Southern Border of California. Bull. Zool. Soc. San Diego, no. 11, pp. 1-28, figs. 1-8, map.
28. 1935. A New Subspecies of **Crotalus confluentus**, the Prairie Rattlesnake. Trans. San Diego Soc. Nat. Hist., vol. 8, no. 13, pp. 75-90, plate 8, map.
29. 1935. **Phyllorhynchus**, the Leaf-nosed Snake. Bull. Zool. Soc. San Diego, no. 12, pp. 1-31, figs 1-4, map.
30. 1935. Notes on Herpetological Field Collecting. San Diego Soc. Nat. Hist., Collecting Leaflet, no. 1, pp. 1-10, figs. 1-4.
31. 1935. The Status of the Sonoran Horned Toad, **Phrynosoma goodei** Stejneger. Copeia. no. 4 of 1935, pp. 178-9.
32. 1935. The Feeding Habits of a Sea Snake. Copeia. no. 4 of 1935, p. 182.
33. 1936. **Crotalus mitchellii**, the Speckled Rattlesnake. Trans. San Diego Soc. Nat. Hist., vol. 8, no. 19, pp. 149-184, plates 19-20, figs. 1-3, map.
34. 1936. The California King Snake, a Case of Pattern Dimorphism. Herpetologica, vol. 1, no. 1, pp. 18-27, figs. 1-2.
35. 1936. The Horned Toads of the **Coronatum** Group. Copeia, no. 2 of 1936, pp. 103-110, figs. 1-2.
36. 1936. A Statistical Study of the Rattlesnakes: I Introduction; II Sex Ratio in Rattlesnake Populations; III Birth Rate. Occ. Papers San Diego Soc. Nat. Hist., no. 1,pp. 2-24, figs. 1-2, tables 1-4.
37. 1936. A Key to the Rattlesnakes with Summary of Characteristics. Trans. San Diego Soc. Nat. Hist., vol. 8, no. 20, pp. 185-276, figs. 1-112, table 1. (Reviewed by H. K. Gloyd in Copeia, no. 4, of 1936, p. 243; Weekly Bull. Calif. State Dept. Public Health, vol. 16, no. 24, pp. 93-95, July 10, 1937; and by H. A. Kelly in Journ. Amer. Medical Assn., vol. 108, no. 22, pp. 1913-1914.)

38. 1937. A Statistical Study of the Rattlesnakes: IV The Growth of the Rattlesnake. Occ. Papers San Diego Soc. Nat Hist., no. 3, pp. 1-56, figs. 3-6, tables 5-16.

39. 1937. A New Snake of the Genus **Sonora** from Mexico. Trans. San Diego Soc. Nat. Hist. vol. 8, no. 27, pp. 363-366.

40. 1938. A Statistical Study of the Rattlesnakes: V Head Dimensions. Occ. Papers San Diego Soc. Nat. Hist., no. 4, pp. 1-53, figs. 7-16, tables 17-21.

41. 1938. Notes from a Herpetological Diary, I. Copeia, no. 4 of 1938, pp. 191-197.

42. 1939. Studies of Reptile Life in the Arid Southwest. I Night Collecting on the Desert with Ecological Statistics. II Speculations on Protective Coloration and Protective Reflectivity. III Notes on Some Lizards of the Southwestern United States. Bull. Zool. Soc. San Diego, no. 14, pp. 1-100, map, tables 1-19.

43. 1939. A Statistical Study of the Rattlesnakes. VI Fangs. Occ. Papers San Diego Soc. Nat. Hist., no. 5, pp. 1-61, figs. 17-46, tables 22-30.

44. 1939. Three New Worm Snakes of the Genus **Leptotyphlops**. Trans. San Diego Soc. Nat. Hist., vol 9, no. 14, pp. 59-66, figs. la-3b.

45. 1939. A Further Study of Pattern Dimorphism in the California King Snake. Bull. Zool. Soc. San Diego, no. 15, pp. 1-23, figs. 1-7.

46. 1939. A New Subspecies of the Western Worm Snake. Trans. San Diego Soc. Nat. Hist., vol. 9, no. 14A, pp. 67-68.

47. 1940. Notes from a Herpetological Diary, II. Copeia, no. 1 of 1940, pp. 15-18.

48. 1940. The Worm Snakes of the Genus **Leptotyphlops** in the United States and Northern Mexico. Trans. San Diego Soc. Nat. Hist., vol. 9, no. 18, pp. 87-162, plate 6, figs. 1-8, maps 1-2.

49. 1940. The Lyre Snakes (Genus **Trimorphodon**) of the United States. Trans. San Diego Soc. Nat. Hist.,

vol. 9, no. 19, pp. 163-194, plate 7, map.

50. 1940. Two New Subspecies of **Phyllorhynchus**, the Leaf-nosed Snake, with Notes on the Genus. Trans. San Diego Soc. Nat. Hist., vol. 9, no. 20, pp. 195-214, plate 8, map.

51. 1940. A Statistical Study of the Rattlesnakes. VII The Rattle, Part I. Occ. Papers San Diego Soc. Nat. Hist., no. 6, pp. 1-62, figs. 47-73, tables 31-33.

52. 1940. (Review of) The Rattlesnakes, Genera **Sistrurus** and **Crotalus**, by Howard K. Gloyd. Copeia, no. 3 of 1940, pp. 206-207.

53. 1941. The Long-nosed Snakes of the Genus **Rhinochellus**. Trans. San Diego Soc. Nat. Hist., vol. 9, no. 29, pp. 289-332, plates 12-13, map.

54. 1941. A New Species of Rattlesnake from Venezuela. Trans. San Diego Soc. Nat. Hist., vol. 9, no. 30, pp. 333-336.

55. 1941. (Review of) Variations and Relationships in the Snakes of the Genus **Pituophis**, by Olive Griffith Stull. Copeia, no. 1 of 1941, pp. 57-60.

56-59. 1941. Four Papers on the Applications of Statistical Methods to Herpetological Problems. Bull. Zool. Soc. San Diego, no. 17.

I The Frequency Distribution of Certain Herpetological Variables, pp. 5-31, figs. 1-5, tables 1-9.

II Illustrations of the Relationship between Populations and Samples, pp. 33-71, tables 1-28.

III The Correlation between Scalation and Life Zones in San Diego County Snakes, pp. 73-79, table 1.

IV The Rattlesnakes Listed by Linnaeus in 1758, pp. 81-95, tables 1-2.

60. 1942. The Status of the Black Whip Snake. Copeia, no. 2 of 1942, pp. 88-97.

61. 1943. The Correlation of Variability Within and Between Rattlesnake Populations. Copeia, no. 2 of 1943, pp. 115-118, tables 1-3.

62. 1943. Tail-Length Differences in Snakes with Notes on Sexual Dimorphism and the Coefficient of Divergence. Bull. Zool. Soc. San Diego. no. 18, pp. 1-60, figs. 1, tables 1-19.

63. 1943. A Graphic Method of Showing Relationships. Bull. Zool. Soc. San Diego, no. 18, pp. 61-76, figs. 1-3, tables 1-6.

64. 1943. A New Snake of the Genus **Sonora** from Lower California, Mexico. Trans. San Diego Soc. Nat. Hist., vol. 10, no. 4, pp. 69-70.

65. 1943. A Desert Subspecies of the Snake **Tantilla eiseni.** Trans. San Diego Soc. Nat. Hist., vol. 10 no. 5, pp. 71-74.

66. 1943. The Coral King Snakes of the Pacific Coast. Trans. San Diego Soc. Nat. Hist., vol. 10, no. 6, pp. 75-82.

67. 1943. The Subspecies of the Rubber Snake, **Charina,** Trans. San Diego Soc. Nat. Hist., vol. 10, no. 7, pp. 83-90.

68. 1944. The California King Snake: A Further Discussion. Amer. Midl. Nat., vol. 31, no. 1, pp. 85-87.

69. 1944. The Sidewinder, **Crotalus cerastes,** with Description of a New Subspecies. Trans. San Diego Soc. Nat. Hist., vol. 10, no. 8, pp. 91-126, plates 5-6, fig. 1, map, tables 1-6.

70. 1945. Herpetological Correlations. I Correlations in Homogeneous Populations. Bull. Zool. San Diego, no.21, pp. 1-101, tables 1-51.

71. 1945. The Geckos of the Genus **Coleonyx** with Descriptions of New Subspecies. Trans. San Diego Soc. Nat. Hist., vol. 10, no. 11, pp. 133-216, 2 maps.

72. 1945. Herpetological Papers of Laurence M. Klauber, 1924-1945. Herpetologica vol. 2, no. 7-8, pp. 143-148.

73. 1945. Some Herpetological Book Prices Then and Now. Herpetologica vol. 2, no. 7-8, pp. 151-174.

LIST OF NEW FORMS DESCRIBED by L. M. KLAUBER

(The first number is the serial number in the above list, of the paper containing the description; the second the page number. Where names have been amended since publication, subsequent references are given.)

Trimorphodon vandenburgi, 1-17.
Crotalus confluentus lutosus, 11-100.

Crotalus viridis lutosus Klauber, 37-191, 1936.

Crotalus confluentus stephensi, 11-108.

Crotalus mitchellii stephensi, Klauber, 33-162, 1936.

Crotalus confluentus decolor, 11-111.

Crotalus viridis decolor Gloyd, Chi Acad. Sci., Spec. Pub. no. 4, p. 216, 1940. See also Woodbury, Copeia no. 4 of 1942, p. 258, and H. M. Smith, Copeia, no. 4 of 1943, p. 251.

Crotalus confluentus abyssus, 11-114.

Crotalus viridis abyssus, Klauber, 37-191, 1936.

Lichanura roseofusca gracia, 14-307.
Leptotyphlops humilis slevini, 17-338.
Leptotyphlops humilis cahuilae, 17-339.
Xantusia arizonae, 18-3.
Crotalus confluentus nuntius, 28-78.

Crotalus viridis nuntius, Klauber, 37-191, 1936.

Phyllorhynchus decurtatus perkinsi, 29-11.
Sonora palarostris, 39-364.

Chionactis occipitalis palarostris, Stickel, Proc. Biol. Soc. Wash., vol 56, p. 128, 1943.

Leptotyphops tenella, 44-59.
Leptotyphlops subcrotilla, 44-61.
Leptotyphlops columbi, 44-62.
Leptotyphlops humilis segregus, 46-67.
Phyllorhynchus decurtatus nubilus, 50-197.
Phyllorhynchus browni lucidus, 50-202.
Rhinocheilus lecontei clarus, 54-308.
Crotalus vegrandis, 55-334.
Sonora bancroftae, 64-69.

Tantilla eiseni transmontana, 65-71.
Charina bottae umbratica, 67-83.
Crotalus cerastes laterorepens, 69-94.
Coleonyx variegatus abbotti, 71-154.
Coleonyx variegatus peninsularis, 71-160.
Coleonyx variegatus sonoriensis, 71-162.
Coleonyx variegatus slevini, 71-167.
Coleonyx variegatus utahensis, 71-171.
Coleonyx variegatus bogerti, 71-176.
Coleonyx elegans nemoralis, 71-195.

SOME HERPETOLOGICAL BOOK PRICES THEN AND NOW

By L. M. KLAUBER

About twenty years ago I started a card file of quotations on herpetological books. This was a sort of defense mechanism invoked after I had paid $9.60 ("very rare" said the catalogue, quoting $12.00, less a clearance discount of 20 per cent) for a work which I subsequently saw in innumerable second-hand book stores at prices ranging from $3.00 to as low as $1.00. The price index also proved to be a useful bibliography, as the quotations in the dealer's catalogues often contain much pertinent information aiding in the study of editions and paginations, the number and state of plates (whether colored or plain), bindings, format, etc. For several years I kept my price list religiously, by clipping items from incoming American and foreign catalogues. I corresponded extensively with foreign book dealers. At length I discovered that bibliography was taking all my herpetological time, leaving almost none for study of the reptiles themselves. Since then the price list has been maintained in a more desultory fashion.

In 1832 a London book publisher and dealer issued a "Catalogue of an Extensive and Valuable Collection of the Best Works on Natural History, Arranged in Classes According to the Linnean System. With an Enumeration of the Pages and Plates each Volume Contains. Now selling at the prices affixed to each, by William Wood, 39 Tavistock Street, Covent Garden, (from 423 Strand)."*

It has occured to me that it might be interesting to compare the 1832 prices of some of the more famous works on herpetology—or those on general natural history contain-

* As an example of price fluctuations, Wood's catalogue was originally priced at 5 shillings in 1832; one copy was quoted at 8 shillings in 1925, and another at 12 in 1926.

ing herpetological sections—with more recent quotations. This is not done with the idea of comparing books, as an investment, with bonds, even at the current low yields of 2 to 3 per cent, for on this commercial plane books cannot compete; but, rather, to show that at current prices—without taking into account the decreased purchasing power of money—many of these fine old books have actually declined in value, and that bargains are still afoot.

My remark on one of my early purchases should not be construed as a reflection on the book-selling fraternity. On the contrary, I have found them always scrupulously honest and almost as often given to under- as over-quotation, using as a fair basis of comparison, the general run of prices of their fellows. However, even an occasional buyer will do well to become acquainted with book markets and sources. He should have at hand a glossary of the terms used in the trade so that he will understand the quotations.* He must learn, for example, that in most scientific catalogues, if the character of binding be not specifically mentioned, the book has only paper covers; and if the plates are not specified as colored they are plain (**i. e.**, black and white). For many of these old books were sold unbound, later to be bound to suit the purchaser; and the plates were often issued in both states. The collector will also learn that age is not a particular criterion of either price or rarity, there being other more important considerations. For example, Hideyo Noguchi's "Snake Venoms", Washington, 1909, is a more expensive and more difficult work to secure than Chas. Owen's "An Essay towards a Natural History of Serpents", London, 1742. Many American dealers overestimate the importance of age, which is not so generally the case in Great Britain and Germany, speaking, of course, of the days before World War II.

* The Bookman's Glossary by John A. Holden, R. R. Bowker Company, New York, 1931, may be recommended. Another useful work is: A. L. A. Glossary of Library Terms by Elizabeth H. Thompson, American Library Association, Chicago, 1943.

With respect to the quotations which I have listed under each book, all prices have been reduced to dollars, using 5 dollars to the pound in 1832 and 4 dollars as of the present. I am not sure that I have chased marks, francs, and lira with accuracy through their convolutions in the tumultuous years following 1918, but in most cases I think no very important errors have been made.

In addition to Wood's Catalogue I have listed some quotations from a price list of the well-known firm of R. Friedlaender and Son, Berlin, 1883, and others from the same dealer giving prewar prices of 1890 and 1914. Occasionally references to prices given by Wm. Engelmann in the "Bibliotheca Historico-Naturalis", Leipzig, 1846, are cited.

In the notes which follow I have abbreviated the book titles, leaving only sufficient phrases to permit identification, for the complete titles of the old days were very long indeed. The full titles will usually be found in the British Museum Catalogue or in that of Casey A. Wood (see bibliography).

Inclusion or omission from this paper have no bearing on the scientific importance of the various herpetological works; in general, I have restricted the entries to books listed by Wm. Wood in his 1832 catalogue, and none published since that date has been included. This has proved a convenient limitation to what otherwise might have been a field without boundaries, expanding these notes beyond the possibility of publication.

As I look back over the old catalogues it seems to me that the golden age for the purchase of works published between 1600 and 1830 must have been in the 1880's. The costs of publishing catalogues were such that the dealers could afford to quote on many relatively minor items, often listed at a few shillings or marks. The great growth in the number of students and educational institutions requiring these works had not yet begun, so there was less competition. In nearly

all cases there had been a reduction below published prices. Of course, it must be realized that the purchasing power of money was quite different then. At any rate, to get a catalogue today with the prices of that time, and what is equally important, with the wide availability of now-rare or obscure items, would be heaven indeed to the herpetobibliophile.

The following abbreviations have been used in the references which follow the title of each book discussed, the complete titles of these bibliographies being given at the end of this paper. These citations will aid in securing more complete data on the books than are contained in these notes.

BM British Museum Catalogue, B. B. Woodward, editor, 1903-40.

CAW Casey A. Wood, Introduction to Literature of Vertebrate Zoology, 1931.

Eng Wm. Engelmann, Bibliotheca Historico-Naturalis, 1846. Continued as Carus and Engelmann, 1861.

Fr. R. Friedlaender & Sohn, Catalogue, 1883.

Harp. Francis Harper, Some Works. . .upon . . Herpetological Nomenclature, 1940.

Lown. Wm. T. Lowndes, Bibliographer's Manual, 1885.

Meisel Max Meisel, Bibliography of American Natural History, 1924-1929.

WW Wm. Wood, Catalogue, 1832 (the work serving as the starting point of the listings which follow).

I wish to acknowledge my indebtedness to Walter L. Necker, U. S. N., for comments and suggestions with respect to the scope and contents of this paper, as well as a number of additional quotations on several of the books.

ALDROVANDUS (U.). Opera Omnia. Folio. Bononiae, 1599-1668.

WW 169; Eng. 425; BM I, 27; CAW 184.

W. Wood quoted the entire work in 13 volumes at $42.

The reptile volume, Serpentum et Draconu, folio, 1640,

pp. (IV) + 427 + XXVIII, is often quoted separately. It contains, as a part of text, many interesting woodcuts, some of which occupy an entire page. My copy has been trimmed to a page size of 233 x 350 mm. The following are some prices on this part: $2 (1883); $2 (1890); $3 (1913); $5, $10, $12.50, $8.75, $20, $21, $23.75, $26.25 (1926); $6, $18.75, $20, (1927); $10.50 (1936); $20, $32 (1937); $13.75 (1939); $11.25 (1940); $15 (1941); $15 (1942); $8, $15, $25 (1943).

BLASIUS (G.) Anatome Animalium. 4to. Amstelodami, 1681, pp. (IV) + 496, 66 full page copper-plate engravings (front. + 5 in text + 60 numbered plates following text).

WW 172; Eng. 249; BM I, 173, CAW 243.

WW $3.75; other quotations $4.50 (1925); $4.50, $6.25, $15 (1926); $10, $15 (1927); $10, (1932); $1.55 (1943).
The size of my copy is 215 x 265 mm. The plates are black; I have no record of its ever having colored plates.

BODDAERT (P.). Five papers, including, in herpetology, de Testudine Cartilaginea, de Rana Bicolore, and an item (de Lacerta Amboinensi) by Schlosser. 4to. Amsterdam, 1768-1772.

WW 172; Eng. 425; BM I, 182

W. Wood listed this at $5.25; recent prices are $2.50 (1914); $1.40 (1926).

The separate parts have been quoted at from 50 cents to $1.25 each. I have an uncut copy which measures 250 x 305 mm. The text is duplicated in Latin and Dutch. The plates (one for each paper) are of large size, folded, and colored.

BONNATERRE (J. P.) and DAUBENTON (L. J. M.). Encyclopédie Méthodique. Les Animaux Quadrupédes* Ovipares, et Les Serpens (Daubenton, 1784); Erpétologie (Bonnaterre, 1789); Ophiologie (Bonnaterre, 1790). 4to., Paris.

* **Editor's Note:** It is to be regretted that certain accents and other diacritical marks were unobtainable because of war conditions. We trust the reader will be lenient.

WW 53; Eng. 426; BM I, 197, II, 527.

These three herpetological items from the encyclopedia are sometimes found bound together, but in various orders, and often with some plates missing, as was the case with Wm. Wood's copy, on which he quoted $13.12. Some past quotations have been $7.50 (1899); $4.75 (1907); $6 (1918); and $10 (1926). The parts, more often the two Bonnaterre items, have been priced separately at from $3 to $10. In one copy which I have, there are only the Bonnaterre items: Erpétologie, pp. XXVIII + 71; Ophiologie, pp. XLIV + 76; followed by 26 plates belonging to part 1, and 43 (one called plate A; 5 are double page) belonging to part 2. All are copper engravings, uncolored. The page size is 219 x 282 mm. Another copy (191 x 255 mm.) has the Bonnaterre Ophiologie first; followed by Daubenton's Les Animaux Quadrupédes Ovipares et Les Serpents, 1784, pp. 547-712; and then the Bonnaterre Erpétologie. The Daubenton format is quite different from the other two, and is without plates.

BORY de SAINT-VINCENT (J. B. G. M.). Résumé d'Erpétologie. 32mo. Paris, 1828, pp. VI + 292, 1 plate.

WW 51; Eng. 426.

W. Wood quoted $1.75; more recent prices have been 40 cents (1910), 65 cents (1914). Friedlaender quoted it at 62 cents in 1883. This little book seems to appear on the market very seldom; it is evidently too insignificant to be quoted.

CATESBY (M.). The Natural History of Carolina, Florida and the Bahama Islands. Folio. London, 1731-43, 2 volumes.

WW 176; Eng. 157; Lown. I, 390; BM I, 327; CAW 281; Meisel III, 340.

W. Wood lists this without a price. Engelmann (1846) gave the current price as $52.50.

This elaborate work went through a number of editions. Of those having the text in English and French in parallel

columns, the first edition (1731-43) has been quoted at $75 (1892); $55 (1903); $80 (1907); $55 (1910); $140 (1924); $75, $160 (1927); $150 (1936). The second English-French edition published in 1754 has been listed as follows: $150 (1921); $155 (1924); $62.50, $140 (1925); $300 (1937), $300 (1939); and the edition of 1771 at $150 (1924); $105, $150, $160 (1925); $125 (1926); $105, $150, (1927); $365 (1941). A German-Latin text (edition of 1750) has been listed at $47.25 (1924); and $37.50 (1926). Another edition (1777) was quoted at $18.75 in 1914. This work, an important item of Americana, is of sufficient general interest to be listed in the records of auction prices (Book Prices Current and American Book Prices Current) published in Great Britain and the United States, which probably accounts for the consistency of the prices compared with some other works.

CUVIER, (G. L. C. F. D.). The Class Reptilia Arranged by the Baron Cuvier with Specific Descriptions by Edward Griffith and Edward Pidgeon (Vol. 9 of Cuvier's the Animal Kingdom as revised by Griffith). 8vo. London, 1831, pp. 1-481. There are 55 full-page, copper-plate engravings, 138 x 212 mm.

WW 178; Eng. 321; Lown. I, 575; BM I, 410; CAW 307.

This volume also contains a separately paged paper (pp. 1-110) by J. E. Gray entitled "A Synopsis of the Species of the Class Reptilia".

W. Wood priced it at $4.50 with plain and $6 with colored plates. The reptile volume does not often come on the market separately. I have seen it quoted at $1.50 in 1896, $2.50 in 1924, and $1.80 in 1926 with plain plates. A copy with colored plates and bound in morocco was listed at $4.50 in 1936.

DAUDIN (F. M.). Histoire Naturelle des Quadrupédes Ovipares. 4to. Paris and Strasburg, 1800.

WW 52; Harp. 695.

W. Wood listed this at $2. I have noted no quotations on this rare work, for a discussion of which see Harper, 1940, 695.

Wood does not quote on Daudin's "Histoire Naturelle des Rainettes, des Grenouilles et des Crapauds", Paris, An. XI (1803?), (BM I, 425) which is moderately common in a quarto but rare in a folio edition. On the former I have seen the following quotations: $4.50 (1890); $5 (1913); $8.75 (1927); $40 (1931); $3.50 (1940); and, in the folio, one quotation $47.50 (1943). The two editions differ in pagination, although both contain 38 full-page plates. They were both issued with colored or plain plates, as advertised in the books themselves. I have a quarto measuring 194 x 258 mm. The plates are beautifully colored. See Harper 693, 721 for interesting comments on these works.

DAUDIN (F. M.). Histoire Naturelle, Générale et Particuliére des Reptiles. 8vo. Paris, An. X-XI (1801-1803). 8 volumes.

WW 52; Eng. 426; BM I, 281, 425; Harp. 693; CAW 311.

For complete data on pagination and plates see Harper.

W. Wood quotes $25; 1883 prices were $6.50 with colored plates, and $3 with plain. More recent quotations are: 1) with colored plates $11.25 (1924); $8, $10, $17.50 (1926); $15, $17.50 (1927); $10 (1940); $10 (1942). 2) with plain plates $1.25 (1896); $3, $3.60 (1910); $5 (1912); $2.50 (1913); $4.60 (1924); $7.50 (1925); $6 (1926); $4.80 (1927). Occasionally sets are available with both kinds of plates in duplicate.

While most sets of this work have the first four volumes labeled An. X and the last four An. XI, vols. 1 and 2, at least, must have gone through a second edition, for one of my sets has these two volumes with the date An. XIII. While the paging of the two editions seems the same, certain type differences indicate the second was reset. I have an untrimmed set, with colored plates, in which the pages measure 137 x 210 mm. Usually they are trimmed to about 125 x 200 mm.

GESNER (C.). Historia Animalium. Folio. Tiguri, 1551-1587, 5 volumes.

WW 3, 180; Eng. 420; BM II, 668; CAW 356.

W. Wood quotes a four volume set of the first edition at $27.50. I shall not attempt to follow this popular old natural history through its many editions, but note only the following quotations on the snake volume (Vol. 5) which is occasionally listed alone. The first edition (1587) was quoted at $12.50 in 1926; a German edition of 1613 was quoted at $10 in 1935, and a later edition (1662) at $10 in 1940, and $15 in 1941. A copy of the second Latin edition (1621) was sold in 1933 for $6.80. I have a copy of this edition with a badly broken binding. The pages, (XII) + 170, measure 235 x 375 mm. The woodcuts are rather poor, even for that day; some are full page, others are scattered through the text. Many of these illustrations were copied by subsequent authors. For an article on Gesner by Willy Ley, see Natural History, Sept. 1935, pp. 149-155.

GOLDSMITH (O.). A History of the Earth and Animated Nature. 8vo. London, 1774, 8 volumes.

WW 181; Eng. 170; Lown. II, 909; BM II, 693; CAW 362

W. Wood quotes this edition (the first) at $9.50. It subsequently went through a number of editions, differing greatly in quality, including several American editions, no doubt pirated. It was originally a pot-boiling job, and is virtually without scientific interest. The herpetological section of the first edition comprises pp. 71-229 of Vol. VII. There are only three herpetological plates. The page size is 130 x 208 mm. Recent quotations on the first edition are: $10, $17.50 (1925); $13.75 (1927); $5.25 (1937).

GRAY (J. E.). Synopsis Reptilium. Part 1 (all published). 8vo. London, 1831, pp. VIII + 85, 10 uncolored plates.

WW 54, 208; Eng. 427; BM II, 712.

My copy has an extra plate, but I suspect it was inserted by a former owner, John Reeves (1774-1856) to whom Gray presented it.

W. Wood listed it at $1.75; other quotations are: $4 (1890); $3.10 (1899); 25 cents (1912); $3.75 (1914); $1.50 (1923).

JACOBAEUS (O.). De Ranis Observationes. 8vo. Romae, 1676, 128 pp., 3 plates.

WW 54; Eng. 421, 428; BM II, 916.

W. Wood lists this at $1, but with the date given as 1767, probably in error. I have seen only one recent quotation, at $1.25.

There was a second and enlarged edition entitled "Observations de Ranis et Lacertis", 8vo., Hafniae, 1686. I have seen this quoted at $1 in 1915 and 1922. I obtained a copy for 50 cents in 1926. It is paper bound and very closely trimmed (92 x 154 mm.). The pages number XII + 144, the plates I-IV.

JONSTONUS (J.) Historia Naturalis. Folio. 6 parts in one volume. Francofurti and Moenum, 1650-53.

WW 183; Eng. 421; BM II, 942; CAW 409.

W. Wood quoted a later edition (1768) at $18.75. There were many editions and arrangements of this popular work.

The original edition seldom appears in the market. It was quoted in 1924 at $22.50.

The serpent sections occasionally are to be had separately. The edition of 1655 was quoted at $1 in 1914; while that of 1757 was listed at $1.75 in 1925 and $5.25 in 1927.

I have a copy of an edition published in Amsterdam in 1657. The reptile section, Part 2, is paged 1-37. There are 12 full-page plates, 228 x 268 mm. Each contains many figures. They are uncolored.

KERR (R.) Translator and editor. The Natural History of Oviparous Quadrupeds and Serpents ... .by Count de La Cepede. 8vo. Edinburgh, 1802, 4 volumes; pp. XLIII + 420, pls. I-XV; pp. XXIV + 345, pls. I-XI; pp. IV + 383, pls. I-IX; pp. XII + 382, pls. I-XIII.

WW 55; Eng. 428; Lown. III, 1295; BM I, 282.

W. Wood quoted $4.50; recent prices have been $2.50, $3.75 (1924); $3 (1926); $1.50 (1930); $2.75 (1937).

The plates in this translation (uncolored, copper-plate engravings) are much inferior to those in the French original, which is larger, being a quarto (see below). One of my sets of Kerr, which I disposed of long ago, seemed to be different from the others. I am therefore of the opinion that there are two editions of this work, but cannot check this now. Bound volumes of this set have pages about 130 x 210 mm. Seekers on the shelves of antiquarian book-stores should remember that it is likely to be labeled "Buffon's Natural History" or "Buffon's Oviparous Animals" on the back.

LACEPEDE (B. G. E. de LaV., Count). Histoire Naturelle des Quadrupédes Ovipares et des Serpens. 4to. Paris, vol. 1, 1788, pp. 18 + 651, 41 plates; vol. 2, 1789, pp. 20 + 527, 22 plates, large folding table.

WW 54, 175; Eng. 428; BM I, 281, II, 1041; CAW 424.

W. Wood listed it at $7.50; later quotations are as follows: $12.50 (1908); $3, $7.50, $10.50 (1924); $3.60 (1925).

These two volumes comprise the reptile sections of the first edition of Buffon's "Histoire Naturelle", which went through many editions. In some of the subsequent editions the reptile sections are Lacépéde revised; in others they are replaced by the works of such other authors as F. M. Daudin **(q.v.)** and Sonnini and Latreille **(q.v.)**. There is also an English translation of the first edition of Lacépé by Kerr **(q. v.)**, 1802; and in German by Bechstein, 1800-2.

The full-page copper plates in the first edition, although uncolored, are beautifully executed, especially in Volume 1 where the backgrounds are usually architectural in character.

I have two interesting copies of the original Lacépéde; the first is unbound and untrimmed, the pages measuring about

215 x 275 mm. The other (194 x 249 mm.) is said to be from the library of Louis XVIII. The bound books are only 45 mm. in thickness, exclusive of covers; the unbound, with the paper under no compression in all the intervening years, about 75 mm.

I have also 2 volumes, 16mo. dated 1788, which together, contain the material from Volume 1 of the regular 4to. edition. The plates in the small edition are very inferior condensations of the large. I do not know the status of the two small volumes, as I do not find them listed in any bibliography. They were purchased from a German dealer in 1926 for 54 cents. In 1942 a similar pair was quoted at $7.50. There was an 18mo. edition of Buffon published in Paris in 1799. The reptile section was by Lacépéde in 4 volumes, and these two volumes may be a part of that set; however, the dates do not agree. I have also seen advertised an 8vo. set 1788-1790 in 4 volumes. My pair may be the first two of this set trimmed closely; they measure 98 x 157 mm. I have not seen this 8vo. set.

LAURENTI (J. N.). Synopsin Reptilium. 8vo. Viennae, 1768, pp. 214, 5 folding, uncolored, copper-plate engravings.

WW 55; Eng. 421; BM III, 1067.

W. Wood $1.75; later quotations $1.75 (1883); $2 (1914); 75 cents (1919); $2.50 (1922); $4 (1926) .

This very important little book is so insignificant that it is seldom listed in any but specialists' catalogues. Like many similar items it could be best obtained before the war through a want-list sent to some German dealer. The size of a bound copy is 109 x 194 mm.

LINNAEUS (C.). Museum Adolphi Frederici Regis. Folio. Holmiae, 1754, pp. XXX + 96 + (VII), 33 plates.

WW 187; Eng. 6; BM III, 1136.

This work is of importance in interpreting some of Linnaeus' descriptions in the Systema Naturae. It was quoted at $10 by W. Wood. There was a quotation of $13.75 in

1925. I purchased Baron Cuvier's copy for $10.10 in 1936, one of the luckiest finds I ever made. It measures 347 x 504 mm. The plates are uncolored; the first two are of monkeys, the last 9 fish, the rest are of snakes.

LINNAEUS (C.). Systema Naturae.

The editions of this all-important work having the greatest present scientific value are the tenth, 2 volumes, 8vo., Holmiae, 1758; the twelfth, 3 volumes (usually bound in 4) 8vo., Holmiae, 1766-68; and the thirteenth (revised by J. F. Gmelin), 3 volumes, 8vo. Lipsiae, 1788-93.

WW 186; Eng. 103, 632; BM III, 1128; CAW 437

W. Wood priced the tenth edition at $2. This edition, the basis of all scientific nomenclature, has now become quite scarce. It was priced at $8 in 1883, $25 in 1918, $31.25 in 1922, $35 in 1925, and $90 and $100 in 1927. A photographic reprint published in Leipzig in 1894 has been variously priced at from $1.85 to $15. More recently a new facsimile reprint has been issued by the British Museum at 8/6. The herpetological section (amphibia) will be found at pp. 194-238.

W. Wood priced the twelfth edition at $4.50; Friedlaender asked $16.25 in 1883. Recent prices have been as follows: $4.75 (1907); $20 (1914); $40, $45 (1922); $46.20 (1924); $40, $45 (1925); $25 (1926); $60 (1927); $50 (1930); $25 (1938); $35 (1939); $40 (1940); $32 (1943).

The thirteenth edition was priced by Wood at $17.50, and by Friedlaender at $3 in 1883. Later quotations have been $5 (1914; $30 (1918); $11.25 (1922); $12.60 (1925); $50 (1941).

Occasionally sections of these works are to be had separately. Thus, in 1937 I secured F. H. W. Martini's copy of the amphibia (pp. 347-418) and fish sections of the twelfth edition for $8.32; and in 1928 the same sections of the thirteenth edition for $3.90 (amphibia: Tom. 1, pars 3, class. 3, pp. 1031-1125).

LINNAEUS (C.). A General System of Nature, translated by W. Turton. 8vo. London, 1802, 4 volumes; also 8vo. London, 1806, 7 volumes.

WW 187; Eng. 179; Lown. III, 1366; BM III, 1128.

W. Wood quotes the seven volume edition at $12.50. Some dealers list mixtures of the two editions, from which I presume that the last three volumes of the second edition were sometimes used to supplement the first. My copy is entirely the 1806 edition. The amphibia section is contained in Vol. 1, pp. 638-700. Some quotations on the 7 vol. set are as follows: $5 (1891); $15 (1907); $11.20, $13.50, $16, $23.75 (1925); $7.50, $10, $12.50 (1926);$9 (1927); $17 (1931); $15 (1942).

MEYER (F. A. N.). Synopsis Reptilium. 8vo., Gottingae, 1795.

WW 56; Eng. 422; BM III, 1301.

W. Wood 62 cents: I have seen only one price, $1.63 in 1925. It seems to be a seldom-quoted work, probably because it is so small that it would be listed only by specialists who quote on separates.

OWEN (C.). An Essay towards a Natural History of Serpents. 4to. London, 1742, pp. XXIII + 240 + (XII), 7 uncolored plates, page size of one copy 195 x 254 mm.

WW 57; Eng. 429; Lown. III, 1749; BM III, 1488; CAW 109, 509.

This is a plentiful and popular work, and therefore one which is frequently quoted in catalogues of dealers not specializing in natural history. W. Wood listed it at $1.50; more recent quotations are 75 cents (1890); $2.50 (1896); $3 (1899); $6 (1912); $1.25 (1913); $1.25 (1914); $3.75 (1915); $1.25 (1921); $2, $6.25 (1924); $5, $6.25 (1925); $1.50, $3.50, $3.60, $5.25, $7.50, $10.50 $12.50, $15 (1926); 85 cents (condition poor), $9.40, $18.75 (1927); $6.90 (1936); $2.50, $10.50, $15 (1937); $8, $10 (1938); $3.70, $4 (1939); $4, $6.60 (1940); $2, $8.50 (1942).

This book is likely to be much over-priced in most American catalogues, which automatically place a premium on age. Mr. Arthur Loveridge has discussed the work in an interesting manner (Scientific Monthly, Nov. 1943, vol. 57, pp. 398-400).

RAY (John). Synopsis Methodica Animalium Quadrupedum

et Serpenti Generis. 8vo. London, 1693, pp. (XIV) + 336 + (VIII), front.

WW 5: Eng. 429: Lown. IV, 2055: BM IV, 1654: CAW 529.

W. Wood, 62 cents; recent quotations $2 (1899); $3.25 (1906); $4.80 (1924); $2.50 (1925); $1.25 (1926); $8.40 (1942); $4.25 (1943).

The frontispiece is a portrait of Ray. The size of one copy is 115 x 192 mm.

ROESEL von ROSENHOF (A. J.) Historia Naturalis Ranarum. Folio. Nurnberg, 1758, pp. (VI) + VIII + 115 + I, plates front. + 24.

WW 57: Eng. 422: BM IV, 1720: CAW 109, 541.

W. Wood $19.75; modern quotations are $7.50 (1897) $10.50 (1899); $5.50 (1910); $16.50 (1914); $17.50 (1922); $17.50 (1924); $37.50 (1929); $52.50 (1932); $28.75 (1933); $31.50, $35 (1935); $38.75 (1936); $25, $37.50 (1937); $58 (1938); $25, $50.40 (1939); $42 (1940); $42 (1941); $30.50, $65 (1942). Friedlaender quoted it at $9 in 1883.

This is a finely executed work with the text in parallel columns in Latin and German, and with the plates in duplicate; one set black with details numbered and lettered, the other beautifully colored. My copy measures 300 x 433 mm.

RUSSELL (P.). An Account of Indian Serpents Collected on the Coast of Coromandel. Folio. London, 1796, pp. VIII + 91, plates 1-46.

W 57: Eng. 429: Lown. IV, 2155: BM IV, 1770: CAW 547.

W. Wood listed this work at $15 in 1832; later quotations are $10 (1915); $22 (1921); $9, $12.50 (1925); $24 (1936); $15 (1937); $12, $21 (1940); $14.50 (1942).

The work as listed by Wood is incomplete. There was a continuation published in 1801 and a still rarer appendix in 1809. Quotations on the 1796 and 1801 parts to-

gether have been $27.50 (1899); $2.50 (1908) (defective?); $84 (1928); $84 (1930); $84 (1932); $22.50, $60 (1933); $30, $50 (1934); $30 (1935); $43.75 (1936); $24.40, $30 (1937); $27.50 (1938); $22, $65 (1940). All three parts have been listed at $37.50 in 1890; $25 in 1913; $37.50 in 1914; $70 in 1921; and $47.50 in 1941. Friedlaender offered it at $37.50 in 1883.

Anyone purchasing this work should check the plates carefully, some of which are often missing. There should, I believe, be 90 altogether; 46 in vol. 1 (43 colored); 32 in the continuation (1801); and 12 (?) in the appendix (1809). Some differences will be found in the colors and execution of the plates, as is nearly always the case where they are hand-colored; also, some copies have been more closely trimmed in binding than others.

I have an uncut copy of the first volume measuring 380 x 545 mm. The type is large and stately. There are 46 plates, as scheduled, but numbers 42 and 43 are really only a single plate, having 2 snakes (3 figures) on one sheet. The plate numbers 42 and 43 are printed together in the upper right-hand corner, so this is not a defect, although it frequently results in the volume being listed as having only 45 plates, when actually it is complete. Plates 39, 45, and 46 (the last two anatomical) are not colored.

Another set containing the 1796 and 1801 sections has both texts in one volume, the plates in another. This has been trimmed to 340 x 486 mm. The continuation is paged V + 38. This copy lacks plate 23 of the 1796 section. Plates 39, 45, and 46 are uncolored as before. The plates accompanying the 1801 section are numbered 1-32, all colored; but there are really only 29, since 3 (3-4, 17-18, 28-29) each comprise two figures on a single sheet. I have no copy of the appendix of 1809. The figures, while beautifully colored, have a rather flat and unnatural appearance. The Indian names may be translated into modern nomenclatorial terms by consulting the synonymies in The Fauna of British India, Reptilia and Batrachia, by G. A. Boulenger, 1890.

SCHNEIDER J. G.). Historia Amphibiorum. 8vo. Jenae, 2 volumes, 1799-1801.

WW 58; Eng. 423; BM IV, 1852; CAW 109, 554.

W. Wood $3. Evidently a rather rare work. I have seen only one quotation on each volume—Vol. 1, 75 cents in 1918; Vol. 2, $2 in 1925.

SCHOEPF (J. D.). Historia Testudinum. 4to. Erlangae, 1792-1801.

WW 58; Eng. 423; BM IV, 1855, Supp. VIII, 1159; CAW 109, 555.

W. Wood quoted a slightly incomplete copy at $13.10.

This was published in both a Latin and German edition, and with plain and colored plates, the plates being the same for both editions. The paging in the Latin edition is XII + 136, plates 1-32 (there are really 35 plates as there are two each of 17, 18, and 30, lettered respectively A* and B); in the German (XII) + 160, similar plates.

In 1913 and 1918 either edition, with colored plates, could be purchased for $5. In 1942 and again in 1943 a Latin edition with colored plates was offered for $22. In the middle 1920's it was possible to purchase in Germany unbound and uncut copies with black plates at $6.40 for either language edition. The untrimmed pages are 250 x 320 mm. The plates of the German copy are 250 x 350 mm.; those accompanying the Latin text, although similar in other particulars, 250 x 320 mm. These seem to be unsold copies still remaining with the publisher or his successors.

SEBA (A.). Locupletissimi Rerum Naturalium Thesauri Accurata Descriptio. Royal folio, Amsteloedami, 1734-65, 4 volumes; vol. 1, 1734, pp. (XXVIII) + 178, 2 fronts. and plate 1-111; vol. 2, 1735, pp. (XX) + 154, plates 1-114; vol 3, 1758, pp. (XXII) + 212, plates 1-116; vol. 4, 1765, pp. VIII + 9 to 42 + 226, plates 1-108.

* Except the first 17 which has no A.

WW 195; Eng. 195; BM IV, 1889; CAW 560.

W. Wood quoted this work with colored plates at $75.

Recent quotations have been (colored plates) $78.75 (1915); $100, $125, $125 (1926); $125, $137.50, $145, $200 (1927); $184 (1936); $500 (1940); $375 (1941); (plain plates) $52.50 (1924); $50 (1927); $50 (1936); $32.50, $83 (1937); $31.50 (1939); $27.75 (1941); $40 (1942). This work is of importance because of Linnaeus' frequent reference to it. The text (in Latin and French) is an explanation of the plates. It is very heavy so that shipping costs are likely to be considerable. All of the prices I have quoted are exclusive of such costs, which are relatively unimportant in the case of most books. I have a set in which the pages measure 340 x 505 mm. Vol. 2 is almost exclusively reptiles, mostly snakes.

SHAW (G.).General Zoology. Vol. III Amphibia (usually published in 2 vols., parts 1 and 2 separately). 8vo. London, 1802; part 1, pp. VIII + 312, plates 1-86; part 2, pp. VI + 313-615, plates 87-140.

WW 7, 58, 196; Eng. 341; Lown. IV, 2370, BM IV, 1911; CAW 565.

W. Wood has this priced at $10 for this reptile part alone: recent quotations $2.50 (1907); $3 (1908); $1.50 (1913); $2.50 (1914); $3.75 (1925); $1.50, $3 (1926); $6.65 (1927). I have no record of any quotations on colored plates.

Most of the quotations on this publication are for the entire natural history, 14 volumes bound in 28, London 1800-1826; it is not often that the two reptile volumes are offered separately. Size 155 x 228 mm.

SONNINI (C. S.) and LATREILLE (P. A.). Histoire Naturelle des Reptiles. 18mo. Paris, An. X (1801). 4 volumes.

WW 58; Eng. 430; BM I, 282, V, 1971; Harp. 693.

W. Wood quotes a set at $3. I have seen quotations on the first edition (An. X = 1801) at $1 (1914 and 1926), and $4.35 (1927); and later editions (1826 and 1830) at $1.50, $3, and $6

(1908 and 1914). I bought 3 sets (1801, 1826, and 1830) in 1926 at $1, $1.50, and $3, respectively. The first is bound in 2 volumes (86 x 143 mm.); the others are in 4 volumes, unbound and uncut. The latter measure about 90 x 145 mm. None has colored plates, although copies of the 1830 edition were published with such plates.

The 1826 edition represents a complete resetting, with some re-editing, of the edition of 1801; the plates however, may be the same as those contained in the first edition, although renumbered. The 1830 edition seems to be the same as that of 1826 in every particular except the title page, which occupies an easily removable signature in both.

In my copy of the 1830 edition a slip has been pasted over the name of the publisher and the date, and an advertisement dated 1885 is bound in the back. This lists Duméril and Bibron, amongst other works. It lists Sonnini and Latreille, 18mo, the work here under discussion, at 10 francs with plain and 17 francs with colored plates. This work comprises Tomes XLII-XLV of Suite A of Buffon, as stated on paper labels on the backs of both the 1826 and 1830 editions. Evidently the 1826 edition, later relabeled 1830, was sold with minor external changes for many years thereafter.

The pagination of my sets is as follows: An. X: vol. 1, pp. XXII + 280, 13 plates; vol. 2, pp. 332, 21 plates; vol. 3, pp. 335, 6 plates; vol. 4, pp. 410, 10 plates.. The plates are not numbered but have the page numbers of the pages opposite which they appear. There is a total of 50 plates; W. Wood says there should be 52.

The 1826 and 1830 editions are paged the same XXI + 208, 332, 335, and 409. There are 54 plates in each set, numbered 1-54. They are somewhat irregularly arranged, and in different orders in the two editions.

SPIX J.B.). Animalia Nova, sive Species Novae Testudinum et Ranarum. 4to. Monachii, 1824, pp. IV + 53, 22 colored plates.

Species Novae Serpentum Brasiliensium. 4to, Monachii, 1824, pp. VIII + 75, 28 colored plates.

Species Novae Lacertarum Brasiliensium. 4to, Monachii, 1825, pp. II + 26, 28 colored plates.

WW 58, 59; Eng. 423; BM V, 1992; CAW 579.

W. Wood listed each of these items separately at $37.50. Friedlaender, in 1883, quoted the first two at $17.50 each, and the last at $12.50. Quotations on these works are rather difficult to follow, since they are often combined in various ways and there were several later editions. The turtle and frog sections are sometimes quoted separately and under dates of 1824, 1825, and 1840. All four parts are sometimes listed as 1839, and there is a lizard re-issue dated 1840. Also, they are quoted as being both quartos and folios. Whether the quartos are separate editions, or whether some have been trimmed more than others, I cannot say. Some quotations follow: All sections together $50 (1890); **Test.** alone $5 (1890); $4 (1913); $7.50 (1924); $30 (1937). **Ran.** alone $15 (1914). **Test.** and **Ran.** $10.50 (1899); $36.80 (1936); $25, $30 (1937); $45 (1938); $35.20 (1940). **Serp.** $7.50 (1913); $24 (1914); $15 (1918); $36 (1926); $28.75 (1936); $48 (1937); $50 (1938); $27.50 (1940. **Lac.** $10 (1890); $6.25 (1908); $7.50 (1913); $7.50 (1918); $31.25(1925); $30 (1938).

TOPSEL (Edward). The History of Four-footed Beasts and Serpents ...Folio. London, 1658.

WW 200; Eng. 643; Lown. II, 883, V, 2696; BM V, 2122; CAW 599.

W. Wood $4.50; recent prices: $34 (1913); $112 (1915); $10.50, $73.50 (1921); $12.50, $15, $47.50 (1924); $85 (1925); $42, $42.50, $62.50, $70, $85, $90, $120 (1926); $37.50, $60, $78, $85, (1927); $20 (1936); $42.50, $90 (1937); $30 (1940); $50 (1941); $50 (1942, from the library of John Barrymore); $50 (1944).

The variations in the prices above given are not really as wide as the figures suggest, for there are great differences in the quality of the books quoted.. This popular old natural history—an anglicized Gesner, well filled with woodcuts—

was a great favorite with generations of children, whose ravages many copies show. Copies were often rebound several times, being trimmed each time so that the margins in some copies are very narrow. I think that every copy above listed at less than $25 is more or less defective, with missing and torn pages, and narrow margins. Also, the highest priced copies are usually especially fine. The "History of Serpents" occupies pp. 587-818; a badly trimmed copy measures 210 x 310 mm.

The 1658 edition was not the first, "The Historie of Foure-footed Beastes" having appeared in 1607 and a supplemental volume "The Historie of Serpents" in 1608. These two sometimes appear in the present-day market bound together, sometimes separately. For the two, prices vary from $20 for a damaged copy to as high as $150 for an especially tall copy. Recent quotations on the serpent section alone are $37.50 (1926), $17.50 (1939). Since dealers will not break a volume to sell the serpent section separately, it does not often appear alone in the catalogues. The combined work is quoted more frequently, and also is listed in the auction records, since it is the type of work in which ordinary book collectors (as opposed to naturalists, or especially herpetologists) are interested. I have a defective copy of the serpent section, pp. (VIII + 315 + (VIII) measuring 223 x 323 mm.

TURTON (W.). British Fauna. 12mo. Swansea, 1807, pp. 230 + VIII.

WW 59, 202; Eng. 343; Lown. 2727; BM V, 2155; CAW 605.

W. Wood quoted $2.62 (published price); $2.50, $3.75 (1924); $1.12 (1925). An obscure little volume 95 x 175 mm.; the amphibia occupy pp. 78-81. There are no illustrations. See also under Linnaeus..

VINCENT (L.). Descriptio Pipae. 4to. Haarlem, 1726.

WW 59; BM V, 2226.

W. Wood $1.25. I have seen no quotations.

WAGLER (J.). Descriptiones et Icones Amphibiorum. Folio. Monachii, 1829-31.

WW 59; Eng. 424; BM V, 2245.

W. Wood quotes $5.25 for each of two parts. A third appeared in 1833 subsequent to the date of his catalogue. I have seen quotations of $5 (1926) on part 1, $4.75 (1924) on part 2, and $15 (1914) on all three parts. Friedlaender's 1883 quotation was $10.50. They do not often appear on the market.

WAGLER (J.). Naturliches System der Amphibien. 8vo. and folio. Munchen, 1830, pp. VI + 354, 2 folding plates; 8 (or 9?) folio plates in atlas.

WW 59; Eng. 424; BM V, 2245.

W. Wood quoted $3 without the folio atlas, as this work is usually found. I have noted copies (without the atlas) priced at $5 (1890); $2.50 (1912); $5 (1914); $2 (1924); $1.50, $2.10 (1925); $3.50 (1926); $3 (1936). There were quotations of $15 with the atlas in 1890 and 1914, but I have seen no recent listings with the atlas included. One copy, which I have, was owned by J. E. Gray, and contains his marginal notes. It measures 133 x 216 mm.

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LIFE-HISTORY STUDIES OF THE SAGEBRUSH LIZARD SCELOPORUS G. GRACIOSUS WITH SPECIAL REFERENCE TO CYCLES IN REPRODUCTION *

By MARIAN WOODBURY and ANGUS M. WOODBURY

Introduction

This study was focused on a western lizard, **Sceloporus graciosus graciosus** Baird and Girard, that was locally abundant around Salt Lake City. The work was designed to correlate field observations with laboratory studies by following histological changes in the reproductive organs—the gonads.

Some phases of its life history are discussed by Van Denburgh (122:273) and by Angus M. Woodbury (1931:40), but in general its life history is not well studied. It is well known to be mainly insectivorous in its food habits by studies of Pack (1921), Gertsch and L. A. Woodbury (1930), Lowell A. Woodbury (1932), Knowlton and James (1932, 1933, 1934), Knowlton (1934) and Knowlton and Thomas (1934, 1936). Lowell A. Woodbury (1934), has a note dealing with its parasites. Studies of the length of the period of post-depositional egg development have been made by Ruthven and Stuart (1932).

Studies relating to reproduction in other species of the genus include an account of behavior based upon field observations of **S. spinosus floridanus** by Newman and Patterson (1909); an account of copulation in captivity of **S. undulatus** with **S. spinosus** by Speck (1924; and a discussion of courtship, mating and territory in both field and laboratory of **S. undulatus** by Noble and Bradley (1933).

*Contribution from the Biology Department, University of Utah, May 14, 1938.

Studies of the testicular cycles of two European species **Lacerta muralis** and **L. agilis** are reported by Reiss (1932). The studies of Kehl (1935) of the testicular cycles of several lizards of the Sahara Desert indicate that lizards of the genera **Varanus, Uromastix** and **Scincus** have a seasonal cycle of sperm production, whereas species of the genus **Acanthodactylus** have a continuous production.

Field Methods

Throughout 1937, collections of lizards were made during the time the animals were found in the field. They emerged from hibernation about the first week of April and disappeared during mid-September. Collections, as far as weather permitted, were made weekly throughout the whole period, and during June, the suspected breeding season, collections were made bi-weekly. Whenever possible, three or more specimens were captured by hand, and the uninjured animals were taken to the laboratory. Collections were usually taken from 10 A. M. to about 3 P. M., since the lizards were more frequently in the open at this time in the localities in which they were taken.

Field records were kept of the locality and date of observations were recorded. These observations covered the subjects of sex, nuptial coloration, behavior and habitat.

Laboratory Methods

For ease in handling, the specimens were anesthetized with ether. The quiescent animal was measured. The body length from the anterior border of the foreleg to the posterior border of the hind leg was used. After measurements had been taken the visceral cavity was opened by a mid-ventral incision. From many of the males, smears were made from the contents of the vas deferens and epididymis. These were studied for the presence of viable sperm and the findings were used as a check for the later histological findings. In female specimens the size, stage of development, and location of the

eggs were observed. The specimen was then pinned open and was fixed **in toto.** Both Bouin's fluid (Guyer, 1936:9) and Gilson's fluid (Guyer, 1936:238) were used to fix the specimens, and both proved satisfactory. After fixation, specimens were washed and then stored in 70% alcohol.

Sizes of the male testes were obtained by measuring the greatest and least diameters with vernier calipers, and the volume was obtained by alcoholic displacement in a graduated centrifuge tube. The tube used was calibrated to 0.1 cc and interpolations to 0.02 cc were possible for the smaller specimens. Comparative measurements were made only on specimens which had been fixed by the same method so that shrinkage may be presumed to be in equal proportion. An attempt was made to obtain the volume of the testes before fixation by measuring its displacement in Ringer's solution, but this caused distortion so the method was abandoned.

The volumes of the testes were plotted against time (Graph I). The resulting sinusoid graph indicated a gradual increase in volume with a maximum about May and a rapid decrease with a minimum in July, with the aid of this graph, testes were selected for histological study at critical times of change in volume to ascertain the causes of such changes.

The testes selected for microscopic study were sectioned by the usual alcohol-xylene-paraffin method. Heidenhain's iron hematoxylin stain (Guyer, 1936:10) was most commonly used but Delafield's hematoxylin (Guyer, -936:9) counterstained with eosin, was also employed. Sections were cut out at 6, 8, or 10 microns in thickness.

Description

The following description is abstracted from that of A. M. Woodbury (1931:40). The adult is usually about 2½ inches in length to the base of the tail which is about 1½ times this length. The snout is rounded, and the neck is of medium length. The dorsal scales are all ridged with strong keels,

which form longitudinal rows. The ventral scales are smaller than the dorsal, and are smooth, flat, and imbricate. Its color on the dorsal side is gray, olive or brownish, which may be tinged with blue or green. A noticeable feature is the three brown or darker lines running backward along the body from each side of the head—one from the labials, one from the eye, and one from the superciliary ridge. These are often joined in front by similar crosslines. These body lines may be interrupted or blotched, or, in older specimens, may tend to unite crosswise. The under parts are white or yellowish. Males have a large blue band or blotch, often edged internally with black, on each side of the belly.

During the breeding season, in many cases, the female develops light blue or blue green bands in the same relative position as the dark blue bands of the male. In addition the female often has an orange flush along the sides of the head over the ears and down the sides of the body while the male frequently has a row of bright blue, or less frequently green, scales along the superciliary ridge, often extending to the tail. The males may usually be distinguished from the females by the presence of two enlarged scales under the tail, one on each side, just behind the anus. During the height of the breeding season the males are distinguishable by the broad base of the tail which is distended by the swollen copulatory organs. Before the eggs are deposited (up to about the twelfth of July) the ovulating females have distended abdomens, which aids in distinguishing them from the males.

Range and Habitat

The type locality of **Sceloporus g. graciosus** is the valley of the Great Salt Lake, and according to Van Dengurgh (1922: 277) it "in most typical form occurs in Utah. Thence, it ranges south to northeastern Arizona, east to Colorado, north to Wyoming, Idaho and Montana, and west, in less typical form, into Nevada and eastern Oregon." In general, its range seems to correspond with the distribution of the Upper Sonoran

and Transition Life Zones. In this region, the most characteristic plants of the Upper Sonoran are the sagebrush **(Artemisia tridentata)**, the Utah juniper **(Juniperus utahensis)** and the pinyon pine **(Pinus edulis)**, and of the Transition Zone the Gambel oak **(Quercus gambelii)**. The common name of this lizard is indicative of its preference in habitat, since it is usually found among the sagebrush.

The lizards of which this study is based were collected from the foothills of the Wasatch Mountains near Salt Lake City, Utah.

A. M. Woodbury (1931:41) describes this lizard as occurring "from the low, desert hills up the mountains at least as high as 7,000 feet. It is usually found among the bushes or trees but ordinarily on the ground or among the rocks. Taylor, however, reports it climbing about among the branches of the sagebrush. When disturbed, it scurries to a bush or shrub for shelter, where it lies quietly unless approached too closely, when it will move into the denser part of the bush or slip into a hole." Around Salt Lake City, it was found almost any place along the hillsides where it could find both food (insects) and shelter.

It was especially abundant in a stand of trees on a gentle slope at the base of some oak covered foothills near the mouth of Emigration Canyon. Overgrazing had removed most of the plant cover from the ground, and erosion had partially exposed the roots of the trees so that there were openings and holes among the roots. The trees were mostly oak and maple. Some trees grew in clumps and in the base of these dried leaves had accumulated, offering concealment for the lizards. They were abundant here. When attempting to elude capture, they would dash to shelter in openings among the roots of isolated trees or hide themselves under the matted layers of dried leaves, or frequently scamper up the trunk of a tree to a height of ten to twenty feet.

Life History

The following account of the life history is based upon accounts given in the literature and upon the field observations of the writers.

Emergence from hibernation. The lizards emerge from hibernation early in April; the immature forms and the adult males usually appearing before the adult females. In 1937, the first lizard observed was an immature female, apparently one hatched the preceding fall. It was taken on April 4th near the gravel pits on the foothills west of Dry Canyon. On April 11th, two more small females were caught in the same vicinity and six other small lizards were observed. On the same date four mature males were caught in the foothills near the mouth of Emigration Canyon, and the next day three more mature males were caught in the mouth of the canyon. One of these was apparently just emerging from hibernation as it was covered with soil and was sluggish in movements.

The absence of females in the two collections is probably not due to chance. If the two sexes had been present in equal numbers the chance of collecting seven males would be one to one hundred twenty-eight. It is possible that earlier emergence of the males allows them to establish their territories before the females arrive on the scene. Newman and Patterson (1909) and Noble and Bradley (1933) state that other members of this genus have the habit of establishing territories. This subject is further discussed under the topic of courtship and mating.

On April 19th eight mature males and two mature females were taken south of the mouth of Emigration Canyon. The females were taken from warm, sunny slopes. The males taken on this date were scattered, and some were several hundred feet higher on the hillsides. By April 26th the two sexes were equal in number and field records show that this condition remained throughout the season.

Food habits. In their food habits, these lizards are almost entirely insectivorous. L. A. Woodbury (1932) reports a small amount (2.8%) of green plant tissue, mostly leaves, in the stomach content of 53 specimens, and we have observed them nibbling on scrub oak leaves.

Courtship and mating. S. g. graciosus has distinct courtship behavior. The male tilts rhythmically up and down on his fore legs. These movements are synchronized with a pronounced swelling and subsiding of the throat. Occasionally this action is interrupted with scurries toward the female. The female apparently has no definite courtship postures. Noble and Bradley (p. 65) note that "**Sceloporus** males court very often but copulation rarely occurs, due apparently to the resistance of the female." The writers have observed courtship behavior in the field many times but have never witnessed copulation.

The earliest available record of attempted copulation in the sagebrush lizard was April 25, 1927, and reported by Marie Kay, a graduate student in Zoology at the University of Utah. This copulation took place in the foothills north of Salt Lake City between 11:30 A. M. and noon. A pair of lizards were on a steep hillside which was well covered with scrub oak bushes among which were open, sunlit spaces. The observer was about 15 feet away from the pair. When first observed the male, who appeared to be highly colored, was about three feet from the female in an open spot, and facing her. His posture was erect, the body well raised from the ground on both fore and hind limbs. The head was raised and extended toward the female with regular, jerky contractions and expansions of the neck and throat at intervals of a few seconds. This was accompanied by a slight hiccoughing sound which first attracted the observer's attention and was seen to be synchronized with the muscular contractions. The tail twitched or lashed at irregular intervals. The female watched

these activities, but with the exception of occasional slight head movements was completely quiescent.

At the end of about five minutes the male made a rush toward the female, stopping abruptly after covering less than a third of the distance between them. He resumed his former posture and movements for several moments; made another short rush and again checked. After a third wait, slightly longer than the preceding two, he advanced to within about three inches of the female where he paused with head thrown well back and with the body rigidly elevated on the fore legs.

At this close approach the female threw her head up, watching him while she moved a few steps aimlessly. The male now advanced the remaining distance very rapidly, rather by a spring than by running. The female definitely resisted his mounting and there was a short, active struggle during which the contestants were unfortunately thrown into the shade where observation was more difficult.

When the combatants were next distinguishable the male was seen to be firmly mounted on the female, clasping her with both fore and hind limbs. The hind limbs were so firmly drawn about the body as to be almost hidden beneath it. Visible movements for a space of several moments were limited to jerky head movements on the part of the male, rather large movements of both tails primarily in a vertical direction and slight generalized body movements.

Next the head of the male was arched rigidly backward, and the tail movements ceased. Due to the shadow in which the lizards lay, non-moving parts were distinguished with difficulty, but the tails did not seem to be fully extended posteriorly. As the male arched his body the female suddenly made unsynchronized scurrying movements of the limbs and neck. After a short period the male was thrown from the female for a distance of several inches and lay quiet for perhaps a minute. The female meanwhile moved several steps and stopped, moving her head from side to side.

The male regained his feet and slowly moved in the direction from which he had originally come. He checked in a sunny spot; and, without further attention to the female, assumed a position similar to his original one and recommenced his throat and neck movements but at less frequent intervals.

Startled by a movement of the observer at about this time, the female secreted herself beneath a clump of sagebrush in the immediate vicinity. The male, apparently giving her no further attention, ran up a steep slope in the opposite direction.

Another account of copulation comes from an unpublished manuscript by Dr. Seville Flowers. This copulation occurred sometime during the latter part of August, 1929. The locality was the yard of a house surrounded by native vegetation in the outskirts of Salt Lake City. "Lizards had taken up residence under the wooden steps of the front porch where they frequently sunned themselves." The lizards were only four to eight feet away from the observer.

"A little female took up a position on a tilted and partially buried brick lying quietly in the sun, occasionally tilting the sides of her head up and down. Her body lay close to the surface of the brick.

"A male lizard came from among the plants and stopped as he became aware of the female. Shortly after he continued toward her with several hesitations during which the fore part of the body was raised up and down on the fore legs, a habit characteristic of many lizards, and finally approached in a slow jerky manner taking up a position parallel with the female. He stopped and repeated the raising and lowering of the body several times. Then rather suddenly he mounted the female's back and clasping her with his forelegs held fast while the tail was curved under the body of the female, the hind leg extending clear under and grasping the side of her body from below. As the genital organs made contact the male lizard underwent a rather violent spasm of quivering which

lasted four or five seconds after which he fell over on his back, first quivering slightly and then lying quietly with the legs slightly extended. After five or six seconds in this position he turned over suddenly and left in a manner not unlike the ordinary habits of lizards. Previous to and during copulation no special motions of stimulation were shown and during the act the female appeared perfectly quiescent and afterward remained on the brick, blinking and tilting her head.

"While this is an uninterrupted account for the sake of clarity, the male actually made two previous attempts, both times losing his grasp and rolling off. The first time he left for a few minutes and returned in the manner described above. At the second unsuccessful attempt he rolled off the brick but returned almost directly."

Noble and Bradley (1933) observed in the laboratory thirty courtships of **S. undulatus** but only four copulations followed courtship. Several postures used in courtship are described. One is "the ordinary quick head bobbing by both sexes, expressive of alertness." This is mentioned in both Dr. Flowers' and Miss Kay's accounts. "Besides this, the males have a 'sex bob'. It consists of slightly flattening the sides making the gorgeous blue bands fully visible, followed by a raising and lowering of the body in which the front legs only are used." Dr. Flowers mentions the raising of the body in the fore legs, but Miss Kay describes the male in one instance as being raised from the ground on both fore and hind legs—a posture which Noble and Bradley described as a fighting one.

"Females also have a definite posture which is peculiar to their sex. It consists of raising high on their four legs and hunching the back until it forms a dome. No male was ever observed to assume this attitude. Sometimes the female holds this postion indefinitely, but usually she hops up and down on the ground in a stiff-legged fashion, progressing forward about two centimeters with each hop." In neither Miss Kay's nor Dr. Flowers' reports on **S. g. graciosus** was this posture

described for the female. We did not observe it in the field but further observations in the field or laboratory might possibly corroborate it.

Noble and Bradley point out that the **Sceloporus** and other iguanid males seize "the female by the skin of the neck before attempting copulation." This was not mentioned in either account of **S. g. graciosus.** Leg rubbing, in which the male rubs the side of the female's body with his hind leg, is mentioned by Noble and Bradley but was not reported in **S. g. graciosus.**

Noble and Bradley described the copulation act in **S. undulatus** as being extremely short and lasting only a few seconds. "The hemipenis is usually visible after coition is completed. The neck and skin of the female is usually held throughout the courtship and through coition if one occurs." The above statements were based on laboratory studies. Field studies were made and the authors found "that mating in the field is less stereotyped than in the laboratory. . . The copulation postures are the same in the laboratory and in the field but the hemipenis is retained within the female's cloaca for much longer periods in the latter situation. Many males in the field retain their hold on the female's neck until they have copulated twice with the same individual. The degree of response varies with the season." (See Text Fig. 1 for picture of hemipenes.)

These authors report examples of homosexual mating in **S. undulatus** and in several other lizards. "It has been shown that the lizards of several families, when kept in good health in large laboratory cages, court and frequently copulate with other males. Since the cloaca of a male lizard permits the insertion of the hemipenis of another male, there is no structural hindrance to this performance. The only mechanism which is present to prevent males copulating with other males as frequently as with females is that males when meeting each other during the breeding season tend to fight. The result is that males tend to occupy discrete territories, which

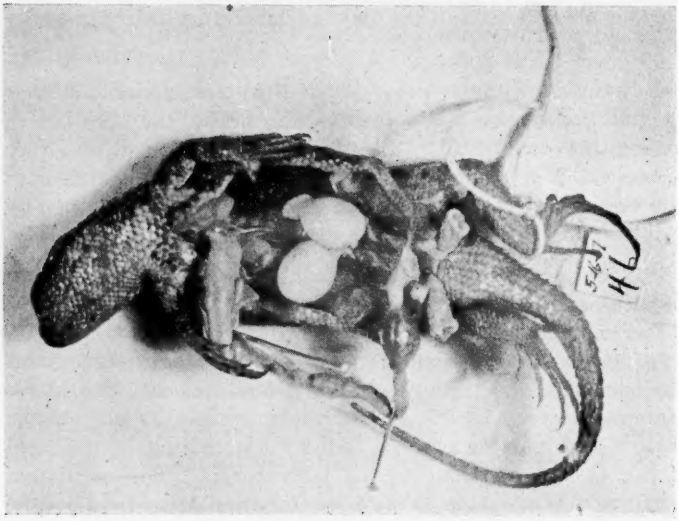


Fig. 1. The copulatory organs, lying in the base of the tail, consist of two eversible sacs, each of which, when separately inserted into the female cloaca, is capable of everting a pair of finger-like projections from the distal end, each of which fits into the enlarged posterior end of the oviduct opening into the cloaca. On the surface of each sac is a sulcus down which the spermatic fluid passes during copulation.

are difficult to recognize in the laboratory but which have been described in the field." Noble, Hassler and Lipsey marked individual specimens of **S. undulatus** by numbered skin clips and small daubs of color and "established the fact that many males are found day after day within ranges which may be called their territories" but these territories overlap considerably and "are not nearly so well defined as in passerine birds."

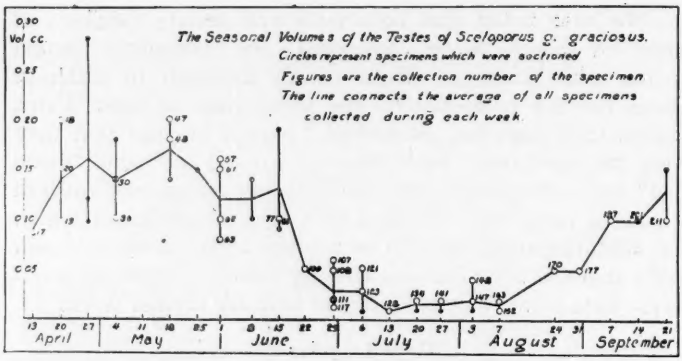
We have noted that both male and female members of pairs of adult **S. g. graciosus** are commonly found in the same vicinity. Both lizards although in different places run for protection to the same bush or hole. Pairs, though they were not marked so I cannot be sure that they were the same ones, were observed around the same "home spot" time after time. On one occasion on an oak covered hillside a male was observed chasing another lizard which was captured and proved to be another male. It would seem likely that the one male was chasing the other from his territory. This problem offers a fertile field for further work.

Gonad Cycles

Development of ova in females. Laboratory work on the female lizards consisted of observations on the condition of the ovaries. The size, stage of development, and location of the eggs were noted and used as a basis for establishing the cycle.

During the summer and fall of one year deposition of yolk on eggs to be laid the following season becomes apparent at this time, microscopic view shows usually three yellow eggs and several smaller white eggs in each ovary. On the basis of the few specimens collected in the early spring, it would seem that little if any yolk is added during the winter. During the spring, however, there is a rapid deposition of yolk in each of the larger eggs. When the egg reaches a diameter of about 7 mm. the follicle ruptures; the egg is discharged and picked up by the oviduct. The ostium of the oviduct, which at other times extends somewhat anteriorly to the ovary, contracts at this phase so that it lies immediately adjacent to the ovary. Such ruptures were observed May 9, May 24 (two specimens), and June 7. The latest date on which large eggs were found in the ovary was June 17.

Testicular cycles in males. The testicular cycle was given special study, the histological aspects of which will



be reported elsewhere, but a summary will be given here. From the measurements taken, the graph in fig. 2 was plotted.

The graph shows that the size of the testis drops rapidly from an average volume of 0.15 cc in late spring to about 0.02 cc in early or mid July, which is about 13% of its volume. The size then gradually reascends in volume nearly to 0.15 cc in the fall before it goes into hibernation. There is little change during the winter, but in the spring, maximum size is again attained.

The explanation for these changes in volume was found to lie in the tubules within the testis, which went through a parallel cycle of enlargement and reduction. In mid summer when the testis volume is smallest, the tubules are lined with only one or two layers of spermatogonia and Sertoli (nurse) cells. The spermatogonia multiply during late summer and by fall, the tubules are much distended and filled with reproductive cells in various stages of development, including 2 or 3 rows of spermatogonia on the outside, 3 to 5 rows of what appear to be primary spermatocytes, a single layer of secondary spermatocytes and central area containing spermatids.

The spring testis is similar to the fall, but the tubules are more fully packed with cells and have greater numbers of spermatids in the center. During May, these spermatids begin to transform into free swimming sperm with tails. Such transformations continue rapidly from late May through June to early July and are discharged from the body. The tubules shrink in size and the testis volume decreases. Observations on specimens indicate that free sperm were found from mid-May to early July, possibly lingering on in the vas deferens for an indefinite peroid.

Correlation of cycles. The ovarian and testicular cycles, although developed separately in the two sexes, produce their products (gametes) at apporximately the same time of year. The sperm, which are being prepared through most of the year become available for transfer to the female from about mid-May to early July at approximately the time when the eggs are ready for fertilization.

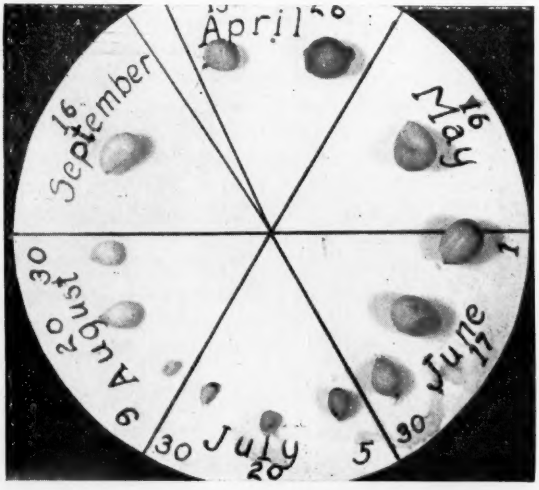


Fig. 3. Change in volume of testis during active season.

Since fertilization must take place sometime after eggs are discharged from the ovary and before the egg covering is completed, the extreme dates that mark these two events, May 12 to early July, would indicate the period when eggs could be ready for fertilization, which in effect is the same period that the sperm are ready for release.

The two reported cases of copulation both occurred, (Apr. 25 and late Aug.) outside of this period. This suggests that the urges that lead to courtship and mating are not limited to this period when gametes are ready for fertilization.

Egg laying. The period required for egg development from follicle rupture to completion of the leathery covering was not determined, but the period from earliest follicle rupture to latest date of egg laying extended from May 9 to July 12, a period of about 5 weeks.

In the laboratory, captive females laid 5 or 6 eggs, each about 12mm long. In natural conditions the eggs are presumably laid in a hole dug by the female on a warm sunny slope. This has been observed by Newman and Patterson (1909) for **sceloporus spinosus floridanus.** These authors estimate the period between the fertilization and deposition of eggs to be ten days in that species.

Egg development. Ruthven and Stewart (1932) estimate the shortest possible period of post-depositional development in **s. g. graciosus** by taking the number of days between the last date of capture of females with eggs and the first date of appearance of young. In the Maggie Basin, Nevada, in 1912 they found a spread of forty-two days between those events, ranging from July 4 to August 14; at Salt Lake City, in 1924, a spread of thirty-two days between July 9 and August 9; and at Fillmore, Utah in 1931, a spread of forty-two days between July 9 and August 17. Near Salt Lake City in 1937, the writers found a spread of thirty-six days between July 12 and August 16.

These data have but little significance, however, as adult females both with and without mature eggs have been collected from June 16th to July 12th. This shows that time of laying is extremely variable and that the estimate of post-depositional development is probably much too short.

A more accurate estimate of the time required for development of the eggs in the ground might be based upon the period between the time of the first observed female that had laid her eggs and the first appearance of young, which in this case extended from June 16 to August 17, a period of sixty-two days; but any incubation period based on this type of observation seems subject to statistical error.

Activity of young. The young lizards were found in the mouth of Emigration Canyon near Salt Lake City, in great abundance about the last of August and for about a month thereafter. They apparently had no territories and were most frequently found, not under the trees of the previously mentioned habitat nor on the oak covered hillsides, but scurrying around in the sun on a gravelly flat where there was a scarcity of plant cover. Some of the young were observed eating ants.

The young are apparently the last members of the population to go into hibernation in the fall and they can be found for some time after the adult lizards have disappeared. In 1936, the last adult was observed on September 22, but 14 young were observed on the same date. More young were observed on September 25 and a lone lingerer on October 11. Why the young go into hibernation later than the adults is not entirely clear, (but there is a possibility that they require a longer feeding time to prepare for hibernation.)

Hibernation. Where the lizards hibernate was not determined, although presumably it is in burrows in loose soil banks. This suggestion is strengthened by the finding of a lizard on April 12, 1937, which had apparently just emerged from hibernation in a loose sandy bank, since it was covered

with moist sandy soil and was still sluggish when caught, while other lizards captured at the same time were active. Perhaps some of them may spend the winter underneath the exposed roots of the trees, under rocks, in natural cavities, or in rodent burrows. It is believed that they hibernate singly since they have not been observed to gather into "dens" for winter as some snakes and some turtles do.

Emergence. Immature lizards were collected after emergence from hibernation by April 4, adult males by April 7 and adult females by April 19, suggesting the idea that the juveniles emerge first, adult males second, and adult females last. That pairing probably occurred soon after emergence was indicated by finding the adults in pairs after April 19, presumably occupying definite territories, since males were observed chasing other males off.

Summary

This study of the Sagebrush Lizard, **Sceloporus graciosus graciosus**, near Salt Lake City, Utah, indicated that young lizards emerged from hibernation by April 4 in 1937, adult males by April 7 and adult females by April 19, after which adults were often found in pairs.

Courtship activities, noted only in the male consisted essentially of rhythmical raising and lowering of the body on the front legs, synchronized with a pronounced inflation and contraction of the throat, interspersed between occasional rapid advances toward the female.

If the female is passive, copulation may occur by the male grasping her around the body with the forelimbs, twisting his body so as to grasp her from the side with his hind limbs and bring his tail under hers so that the two cloacas meet. Only one of the two hemipenes is inserted at one time, it being partly forked on the end to fit the openings of both oviducts.

The ovarian cycle begins when a young female is about one year old, by the partial enlargement of 2 or 3 ova in each

ovary before she goes into hibernation for her second winter. After emergence in the spring these eggs continue enlargement until about 7 millimeters in diameter, when the follicles rupture and they pass into the oviduct (observed May 9 to June 7).

The testicular cycle begins at a similar age of one year, when the testes enlarge to a volume of nearly 0.15cc by the time of the second hibernation. At this time the tubules are much enlarged by the presence of many layers of germ cells in various stages of development from spermatogonia to spermatids. After emergence in the spring, the tubules become further packed with maturing spermatids and reach maximum size in early May. Thereafter, the spermatids are rapidly transformed into sperms and are discharged from the body. By early July the tubules are nearly empty and the testes have shrunk to about 13% of their maximum spring volume.

The sperms and ova are ready at about the same time for fertilization, which must take place in the oviduct while the yolk of an ovum is receiving its coat of albumen and before it gets its final membranous covering, usually between early May and early July.

A female usually lays about 5 or 6 eggs, which are probably buried a short depth in the soil, sometime between June 16 and July 12. The probable period of development in the soil is estimated to be about two months (estimated 62 days from June 16 to August 17).

In the fall, the young are found active, (October 11) 2 or 3 weeks longer than adults (September 22) before going into hibernation.

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NOTES ON TEXAS REPTILES

By JAMES McCALLION

The following notes concern reptiles received from Mr. Philip Harter of Palo Pinto, Texas during the year of 1942. There are included some interesting notes taken in the field by Mr. Harter and printed here with his permission. The observations on **Gerrhonotus liocephalus infernalis** Baird are based on two specimens from the vicinity of San Antonio, Texas.

Gerrhonotus liocephalus infernalis Baird

Two lizards of this species were in my collection for over a year until they succumbed to an infestation of mites. During this time both fed well accepting insects (grasshoppers, roaches, mealworms, various beetles and their larvae and cicadas), lizards (**Eumeces obsoletus, Holbrookia texana and Sceloporus,** snakes (small **Thamnophis sirtalis sirtalis,** new-born **Elaphe guttata** and **Storeria d. dekyi**) and mammals (one specimen ate a small dead mouse). When stalking their food, these lizards depend upon stealth. Just before seizing the prey, the body of the lizard becomes rigid and is raised above the ground and the tail is vibrated. A large **Thamnophis s. sirtalis** was placed in the cage containing a **Gerrhonotus** to see if the lizards would notice it. When the snake passed by the lizard one of them drew back its head and hissed, but made no effort to attack. Both lizards shed their skins entire.

Eumeces obsoletus (Baird and Girard).

These lizards accepted the following items as food: insects (beetles, mealworms and grasshoppers), sow bugs, earthworms, and young **Sceloporus.**

On May 29, 1942, one of these lizards laid five eggs, an inch below the surface of the sand in the cage. On the following day she laid three more eggs. These averaged 15mm. X 5.9mm. in size and were white in color. Another lizard laid eight eggs on May 31, 1942, averaging 16.5mm. X 9.5mm.

Salvadora lineata Schmidt

A specimen of this species was encountered while eating a small **Natrix harteri.** Later it attacked a small **Elaphe**

laeta, grasping it back of the head, and working its jaws over the snake's body. However, in the struggle that followed, the **Elaphe** broke loose. Other specimens under my observations accepted lizards (**Sceloporus** and **Cnemidophorus** and mice. A specimen in Mr. Harter's collection laid six eggs on June 14, 1942.

Elaphe obsoleta confinis (Baird and Girard).

A large female of this species began to lay eggs on the afternoon of July 11, 1942. It took approximately six minutes to lay each egg, with a rest period of ten minutes between each deposit. She deposited the last egg at midnight, and paid them no further attention. There was a total of eighteen eggs, creamy white in color and averaging 52.6mm. X 31mm. in size.

Lampropeltis getulus holbrooki x splendida.

On July 27, 1942, a female of this species laid eight eggs which averaged 38mm. X 14mm. in size; all were infertile.

Mr. Hartage found two snakes of this species in the act of mating under a rock on the Harris Ranch, six miles north of the town of Palo Pinto on April 4, 1942.

Thamnophis marcianus (Baird and Girard).

There were three gravid females of this species in the collection. The first gave birth to 18 living young on July 24, 1942. The second gave birth to 16 young, one dead, on July 30, 1942. The third gave birth to 12 young on August 2, 1942. One young of the last litter differed in color and markings from the others in that the ground color was uniformly green instead of the usual black spots between the stripes.

Miscellaneous

Mr. Harter states in his letters that he has seen **Sonora episcopa** (Kennicott) eating scorpions in the field on three different occasions.

He has observed a freshly captured **Hypsiglena ochrorhyncha** Cope regurgitate a **Cnemidophorus** and another regurgitate a snake of the genus **Sonora.**

Young **Crotalus atrox** Baird and Girard, in Mr. Harter's collection fed on lizards (**Sceloporus**), as well as mice.

NOTES ON THE HERPETOLOGICAL FAUNA OF ALLEGHANY COUNTY, VIRGINIA

By RICHARD L. HOFFMAN

Alleghany County lies in the central western part of Virginia, its western boundary forming part of the Virginia state line. The county lies entirely within the Valley and Ridge Province. The drainage is that of the upper James River, whose valley affords passage through the north-south ridges for several eastern species such as **Cnemidophorus sexlineatus.** Forest cover is mostly mixed hardwoods.

Most of the specimens referred to in this report were taken within a few miles of Clifton Forge, in the eastern part of the county. Many, however, have been taken at other places, and the situation of these places in relation to Clifton Forge is noted at the first mention of each locality. In addition to the specimens in my collection a few others have found their way to certain museums. In July, 1910, W. D. Appel made a small collection at Clifton Forge, and these specimens are now in the collection of the United States National Museum. Specimens taken at Long Dale, 2 miles east of Clifton Forge, by M. M. Nicely in 1934 were presented by Dr. H. K. Gloyd to the University of Michigan Museum of Zoology. With the exception of **Ambystoma maculatum** specimens of all the salamanders listed have been sent to the Carnegie Museum.

46 species and subspecies of amphibians and reptiles have been found in Alleghany County. In addition to these, the following species may be found upon further search: **Desmognathus q. quadramaculatus, D. o. ochrophaeus, Eurycea lucifuga, Plethodon wehrlei, Scaphiopus h. holbrooki, Natrix septemvittata, Thamnophis s. sauritus,** and **Clemmys guttata.**

Numbers after the name of each species in the following lists indicates the number of Alleghany County specimens of that form in my collection.

Ambystoma maculatum (Shaw). Egg masses which agreed with published descriptions of those of this species were taken from a pond on April 16, 1944. The embryos were about 8mm in length, and gills were visible.

Triturus viridescens viridescens Rafinesque. 11. Clasping noted from March 25 to April 10. A captive laid about 26 eggs on March 30. Adults, both aquatic and terrestrial phrases, were found in considerable numbers (150-200) at a small lake near Griffith. (7 miles east of Clifton Forge), on October 3, 1944.

Desmognathus fuscus fuscus (Rafinesque). 8. Very abundant.

Desmognathus phoca (Matthes). 11. Occurs locally in perhaps greater numbers than **fuscus.**

Plethodon cinereus cinereus (Green). 1. I have seen less than 18 specimens of this form near Clifton Forge. Most of these were taken in small shaded ravines from under logs, but one specimen was found in loose shale about the base of a pine tree on May 19, 1944.

Plethodon glutinosus glutinosus (Green). 4. Usually found in or under rotting logs; frequently in some kind of small passageway.

Gyrinophilus porphyriticus porphyriticus (Green). 3. These are larva; the largest, 90mm in length, was taken on July 17. The others, about 50mm, were found on September 17, 1944.

Pseudotriton ruber ruber (Latreille). 7. A larval specimen taken from a spring on April 10 is 86mm long. The gills of this specimen, which seems near transformation, are about 6 or 7mm long.

Eurycea bislineata bislineata (Green). 6. 5 of these were taken from under stones in water; the other, found later in the year, was dug out of a wet creek bank.

Eurycea longicauda longicauda (Green). 4. One juvenile was found in water on May 3. The four adults in my collection were taken from under logs and trash in fairly dry places.

Bufo americanus americanus Holbrook. 1. Never found in a reddish phase locally, as is often the case with **fowleri.**

Bufo woodhousii fowleri (Hinckley). 3. Mating usually occurs in May, when the toads may be heard calling from small streams.

Acris crepitans Baird. 4. Sound records for Clifton Forge on the night of March 17. Several dozen specimens seen near Griffith on October 3, 1944.

Pseudacris feriarum (Baird). 7. Eggs of this species were taken on March 25 and April 3. Those found on the latter date hatched on April 10. This species was first heard calling on March 17.

Hyla crucifer cruficer Wied. 1. This form usually begins calling about the middle of April, when **P. feriarum** has completed mating.

Hyla versicolor versicolor (LeConte). A local specimen has been observed at the same place in a certain tree each summer for the past three years.

Rana catesbeiana Shaw. 1. Rather generally distributed, along lakes, rivers, and rather small rocky streams.

Rana clamitans Latreille. 6. My observations indicate that this species is seldom found along lakes and large rivers. None of well over a hundred specimens have been found in such localities, but rather along small creeks and forest pools. In nearby Douthat State Park (Bath County) **clamitans** is restricted to small creeks, and is replaced at the lake shore by **catesbeiana.**

Rana palustris LeConte. 2. This species seems to prefer rather rocky and cold mountain streams, at least when adult. Juveniles are sometimes found at some distance from the water. One of my specimens exhibits fusion of the dorsal spots, as all on one side of the back are united.

Sceloporus undulatus fasciatus (Green). 9. Preliminary courtship behavior was noted between two specimens seen the first week in April, 1943.

Cnemidophorus sexlineatus (Linnaeus). 3. Somewhat over a dozen have been seen in 1944. One of these, a juvenile found on August 23, had a very greenish tail.

Eumeces anthracinus (Baird). 1. This specimen was taken on March 25, 1944. Two others have been seen, at an elevation of 3000 feet.

Eumeces fasciatus (Linnaeus). 1. This specimen was taken near Falling Springs (9 miles northwest of Clifton Forge) on August 13. It is a juvenile approximately 29mm in body length. An adult was taken at Clifton Forge on January 24, 1944. USNM 55433 was taken on July 21, 1910, at Clifton Forge.

Eumeces laticeps (Schneider). 1. The sublateral lines are indistinct in this specimen, which is 79mm in body length.

Leiolopisma unicolor (Harlan). One specimen was taken in 1942, but escaped.

Carphophis amoena amoena (Say). 4. (3 males, 1 female). These specimens were discovered in May, 1944 under stones, rotting logs, and trash. Although the series is small very marked differences in sex are shown by the application of Blanchard's (1942) V-C rule. Males, 87, 88, 88; female, 105.

Diadophis punctatus edwardsii (Merrem). 1. A young specimen taken in May, 1943, ate a small **Eumeces** sp. confined in the same collecting bag.

Heterodon contortrix contortrix (Linnaeus). 2. Three forms occur locally; blotched, banded and melanistic.

Opheodrys aestivus (Linnaeus). 1. Although it is more common in valleys, I have seen this form on mountainsides as high as 2900 feet.

Opheodrys vernalis vernalis (Harlan). 2. These are apparently the first **vernalis** reported from a definite locality in Virginia. Specimens have been taken in the George Washington National Forest. I have seen about a dozen specimens of this form.

Coluber constrictor constrictor (Linnaeus). 1. This specimen had fed upon an adult **Desmognathus f. fuscus**. Uhler, Cottam, and Clarke (1939) do not mention salamanders in the list of food of this species.

Elaphe guttata (Linnaeus). 3. I have seen about a dozen specimens of this species near Clifton Forge. The snakes are often found in close proximity to houses. The preferred habitat seems to be more or less in pine woods, and about clearings in mixed forests.

Elaphe obsoleta obsoleta (Say). 1. Rather rare. The specimen listed was taken on October 1, 1944. One of two specimens collected in 1943 was seen on October 29, on top of Warm Springs Mountain (5 miles north-north-west of Clifton Forge).

Pituophis melanoleucus melanoleucus (Daudin). 1. This specimen was found DOR on June 14, and was so mangled that only the head was saved. This adds another county to the known Virginia range of the species, which has been summarized by Llewellyn (1943).

Lampropeltis triangulum triangulum (Lacepede). 1. This specimen was taken at an elevation of 2400 feet. Two other specimens I have seen were found at an altitude of 3000 feet.

Natrix sipedon sipedon (Linnaeus). 4. The most common local snake. One dead specimen found on September 13, 1944, had about 25 complete dorsal bands.

Storeria dekayi dekayi (Holbrook). A DOR specimen found north of Clifton Forge in 1943, and identified as **dekayi**, probably belongs to the typical subspecies.

Storeria occipito-maculata occipito-maculata (Storer). 4. DOR specimens were found in 1943; one of these, a juvenile, was a dark phase specimen.

Thamnophis sirtalis sirtalis (Linnaeus). 2. This species is common in low damp places and along the tops of mountain ranges.

Agkistrodon mokeson mokeson (Daudin). 6. This snake may usually be found in certain "dens" along the top of Middle Mountain, 4 miles north of Clifton Forge. Specimens congregate at such places throughout the summer, occasionally in company with rattlesnakes. A captive female gave birth to 4 young on August 20, 1944.

Crotalus horridus horridus Linnaeus. 1. Fairly common in elevated parts of the country. Several specimens have been killed in and near Clifton Forge.

Sternotherus odoratus (Latreille). 3. 1 adult collected at Clifton Forge in 1944.

Chelydra serpentina serpentina (Linnaeus). Common. Often seen in small mountain streams far from any sizeable river or creek.

Terrapene carolina (Linnaeus). 4. In spring and summer this form is commonly found in damp hollows. Captives have eaten desmognathids and **Plethodon glutinosus**, in addition to slugs, etc.

Chrysemys picta picta x marginata. 5. If **marginata** is considered a subspecies of **picta** my specimens must be regarded as intergrades. In all the specimens I have examined from this locality the venter is variously marked, but is never immaculate. The arrangement of the neural and costal plates, however, is typical of **picta.**

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I wish to express my obligation to Mr. M. Graham Netting, who has had the kindness to review this manuscript. It has profited much from his generous advice and suggestions.

CLIFTON FORGE, VIRGINIA

HERPETOLOGICA AT THE FRONT

"Jan. 28, 1945 / With the 2nd Army in the Ardennes.

Dear Major Grant: The No. 6 of Vol. II of Herpetologica reached me a short time ago while I was up in the front lines. As it was the first reading matter on herpetology that I've seen in a long time, I lugged it around with me up front gathering just bits of reading during slack times. So it became, so to speak, a battle casualty, all battered and torn. Hardly fit condition to salvage for my home library.

Therefore I'd like to obtain another copy of this issue—to be sent with all subsequent numbers to ....

Thank you very much, Yours truly,

IRWIN LESTER FIRSCHEIN."

OVARIAN EGGS IN PLETHODON RICHMONDI

By JOHN THORTON WOOD

Nothing has been published on the time of egg-laying of **Plethodon richmondi** (Netting and Mittleman). The only report on ovarian eggs in this species was published by Bishop (1943, p. 274) on examination of a specimen in the Cornell University collection. This female came from Buckhannon, West Virginia, and contained 7 ovarian eggs, each 3.0 mm. in diameter. Unfortunately, there was no collection date with the specimen.

Three groups of **Plethodon richmondi** from the Dayton and Yellow Springs areas have been examined by the author. On April 21, 1944, Cpl. H. J. Walters collected two gravid females from beneath rotten railroad ties on the moist floor of an abandoned limestone quarry 5 miles north-east of Dayton, Montgomery County, Ohio. On May 14, 1944, the author collected eleven additional females from a wooded ravine in Glen Helen, Yellow Springs, Greene County, Ohio. On October 15, 1944, Doyt Ladd and the author obtained four more gravid females from the Glen Helen habitat. Seventeen females were examined in all, and of them seven contained large ovarian eggs. Chart 1 lists the sizes of females and number of ovarian eggs (when present); chart 2 records collection dates, localities, and sizes of eggs.

All females of the **Plethodon richmondi** series collected October 15 contained 9 to 15 ovarian eggs. Although the maximum diameter of the largest egg was 2.5 mm., the average diameter for the entire group was estimated at 1.25 mm. Minimum diameter of 0.5 occurred in the case of 6 eggs in 2 specimens.

Both gravid females collected April 21 contained ovarian eggs ranging in number from 9 to 11.The maximum diameters were 4.0 mm. and 3.0 mm. respectively, but the average diameter was estimated at 2.5 mm.

The specimen collected May 14 contained 14 eggs whose average diameter was also 2.5 mm.

These records indicate that the average diameter of the ovarian eggs doubled between October 15 and April 21 or May 14, while the volume contents of the eggs increased 800 per cent over this same period. The females examined in spring did not seem thinner than the specimen collected in October. This suggests that this species undergoes brief or discontinuous hibernation, to permit considerable feeding between these collection dates.

Of the 11 specimens collected May 14, 8 contained no ovarian eggs. These females ranged in total length from 63.0 mm. to 29.0 mm. and while the average length of the females in this group was only 78.3 mm., the 4 largest specimens average 90.0 mm. This size is 6 mm. longer than that of 2 specimens from which large ovarian eggs were recorded.

Two other specimens of the May 14th series contained tiny ovarian eggs; one female, 98.0 mm. total length, contained approximately 17 minute-sized ovarian eggs, and a second, 77.0 mm. total length contained uncounted microscopic eggs. These may have been newly-developed ovarian eggs produced after time of egg-laying.

One specimen (total length 84.0 mm.) collected May 14 contained 5 large-size ovarian eggs each 2.5 mm. average diameter. These may not represent the total number of eggs carried by this female earlier in the season, since these records indicate the season for egg-laying by **Plethodon richmondi** lies between Apr. 21, and May 14th, in this region.

Among salamanders containing large ovarian eggs, if this May 14th specimen containing 5 eggs is discounted, the remaiding **Plethodon richmondi** had from 9 to 15 large ovarian eggs present. The average number of eggs in these 6 cases is 11.5, 60.9 per cent greater than the number of eggs contained in the Buckhannon, West Virginia specimen mentioned by

Bishop (ibid.)—the only other record available for comparison.

Bishop (ibid., p. 273) reports that **Plethodon richmondi** seems closely related to **P. cinereus**, both in structural features and coloration. He states that the egg-laying season of **P. cinereus** extends from June through July; in the north (ibid. p. 243). Schmidt 2 (p. 14), states that in the Chicago area the eggs of **P. cinereus** are deposited no earlier than June, and often as late as August. Although the dates of egg-laying for **P. cinereus** have not been determined for the Dayton area, **P. richmondi**, apparently deposits eggs much earlier in this region.

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CHART 1.

SIZE OF FEMALES, AND NUMBER OF OVARIAN EGGS PRESENT, IN

Plethodon richmondi

D.P.L.M.* Cat. No.	Total Length (mm.)	Number Of Eggs	Date	Locality
1-44	121.0	9	4-21-44	5 miles NE of Dayton, Montgomery Co. Ohio
3-44	138.0	11	4-21-44	" " "
281-44	84.0	5	5-14-44	Glen Helen Yellow Sr'gs. Greeen County, Ohio.
284-44	89.0	0	5-14-44	" " "
285-44	63.0	0	5-14-44	" " "
286-44	88.0	0	5-14-44	" " "
287-44	92.0	0	5-14-44	" " "
288-44	66.0	0	5-14-44	" " "
289-44	72.0	0	5-14-44	" " "
290-44	65.0	0	5-14-44	" " "
291-44	91.0	0	5-14-44	" " "
292-44	98.0	17	5-14-44	" " "
293-44	77.0	?	5-14-44	" " "
485-44	110.0	13	10-15-44	" " "
486-44	103.0	12	10-15-44	" " "
489-44	85.0	9	10-15-44	" " "
495-44	104.0	15	10-15-44	" " "

*DPLM—Dayton Public Library Museum collection.

CHART 2.

SIZES OF OVARIAN EGGS OF **Plethodon richmondi**, AND DATES OF COLLECTION

D. P. L. M.	Date	Size of Eggs: (mm.) Max.	Min.	Av	Remarks Odd Eggs	Locality
1-44	4-21-44	3.0	2.0	2.5	Cat. No.	5 miles NE of Dayton, Montgomery County, Ohio
3-44	4-21-44	4.0*	1.0	2.5	*-(1 egg)	" " "
281-44	5-14-44			2.5		Glen Helen, Yellow Springs, Greene Co., Ohio
485-44	10-15-44	1.5	0.5**	1.0 to 1.2	**-(4 eggs)	" " "
486-44	10-15-44	1.2	1.0	1.1		" " "
489-44	10-15-44	1.5	1.0	1.25		" " "
495-44	10-15-44	2.5***	0.5 ****	1.5 to 1.0	***-(1 egg) ****-(2 eggs)	" " "

MICROHYLA OLIVACEA (HALLOWELL) IN NEBRASKA

By RICHARD B. LOOMIS

The only known published record of the western narrow-mouthed toad for Nebraska is the type locality stated as "Kansas and Nebraska". Hallowell (1856) did not specifically state the locality. It is probably Kansas. The following records place the range into Nebraska. The known range is now, Southeastern Nebraska, Western Missouri, Kansas to Texas, and Southern Arizona; Northern Mexico in Coahuila, Durango and Sonora.

On May 15, 1942, James Harley and the writer collected two **Microhyla olivacea** three miles south of Barnston, Gage County, Nebraska. They were found under flat stones in moist earth on an almost treeless hillside. During another trip to the same locality on September 1, 1942, two immature specimens were secured while they moved about a grassy meadow in a light morning rain.

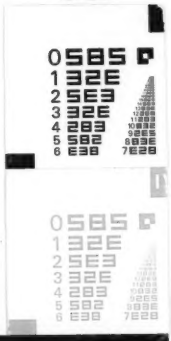
Two additional field trips, two miles southwest of Barnston, uncovered fourteen adults on May 29, 1943, and two adults on June 26, 1944. J. Knox Jones, Jr. accompanied the writer on the first trip. All of these toads were found under flat moist rocks on northern slopes close to trees.

The **Microhyla olivacea** agree with the description of Kansas specimens (Smith, H. M. 1934. The Amphibians of Kansas.): upper surface olive to greenish gray; few black spots on back and upper surface of hind legs. On some specimens the spotting forms rows middorsally, and on the femoral and tibial region. Ventrally they are immaculate white with slight gray to brown pigmentation around gular region occasionally. Throats of males are black.

The young toads (2) measured 22mm. body length, hind leg 23mm. Adults (13) body length varies from 28-36mm., hind leg is 36-42mm. Males (4) body length, 28-32mm., hind leg 36-39mm. Females (9) body length 30-36mm., and hind leg 39-42mm.

No breeding was observed, although five other anurans were found mating on May 15, 1942. Gravid females were secured on May 29, 1943. The only small specimens were found on September 1, 1942.

Reptiles found in association on the hillsides two miles southwest of Barnston were; **Diadophis punctatus arnyi, Coluber constrictor flaviventris, Elaphe laeta laeta** and **Agkistrodon mokeson mokeson.**

The specimens are in the University of Nebraska State Museum, Herpetological Collection numbers A, 431-443, 490 (skeleton), 493-496.

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